

Radio Control CAR ACTION

VOLUME 12, NUMBER 5 · MAY 1997











THIS PAGE: top to bottom—Bolink Legend goes drag (photo by Rick Eyrich); Kyosho Mantis cars (photo by John Howell); MRC Ironman (photo by John Howell); home-built Tamiya King Hauler (photo by Walter Sidas); pit lane at the QSAC Nats (photo by Rick Eyrich); Team Associated RC10L20 (photo by Walter Sidas).

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ON THE COVER: main image—MRC Ironman monster truck (photo by John Howell); homebuilt Tamiya King Hauler (photo by Walter Sidas); the starting grid at the QSAC Nationals (photo by Rick Eyrich); Kyosho's Mantis EP and GP parking-lot racers (photo by John Howell).

EDITORIAL

The hobby of global proportions

OTHING SERVES to remind us more of the *global* scope of our hobby than attending an international hobby show. On entering this year's Nuremburg, Germany, toy and hobby fair (now in its 48th year), I was instantly reminded that the U.S. is just one of many countries where R/C is a popular pastime (actually, I had the impression that some of these folks take their hobby perhaps a bit *too* seriously!). Also, you learn that R/C interests vary from country to country (for more on Nuremburg, turn to "Inside Scoop").

Take Japan, for example. According to many manufacturers, the hottest things there right now are glow-powered touring cars. All of the large companies have something to offer in this area, and the aftermarket "hot-rodder" companies are having a sales field day with aluminum everything for all the popular chassis. If trends follow—as they have with 4WD, electric touring cars—should we be on the lookout for the next wave of nitro sedans?

By contrast, many European vendors explained that it's the popularity of large-scale models that is on the rise. You'd be amazed at the sophistication of some of these European techno giants: scale suspension, in-board shocks like a real F1 car, even four-wheel disk brakes and rack-and-pinion steering. Fortunately for the Europeans, R/C racing is more of a spectator sport, so they are able to construct permanent tracks for these behemoths. I hope this is a trend that will cross the pond.



You read, wrote and mailed, faxed and emailed your entries, and we're as pleased as punch to publish the results of our " '97 Readers' Choice Awards." You'll notice that we've changed several of the categories to better reflect the purpose of the awards, which are intended to honor outstanding products and performances. As evidenced by the incredible response to this feature, you're anything but shy about giving your opinion!

New Product Section

You'll notice that we've altered the way in which we present our "Product Watch" reviews. Instead of scattering them throughout the magazine—they were apparently sometimes difficult to locate (and you think we don't listen!)—we've gathered them in one section that's complete with its own "contents." We've also included more product reviews than ever before, and look for even more in the coming months. There are a lot of accessories and gadgets out there that beg review! If you've a product in mind that you'd like to see reviewed, contact us by email, fax or the old-fashioned letter.

Frank Masi, Executive Editor



Ever wonder how we get those killer action shots? Chasing runaway monster trucks in subzero temperature is just part of the job.

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An Oldie but a Goody

I went to my local R/C shop (Sandy Fleming's Fast Eleck-Tricks) for parts for an RC10 I had received from my uncle. The guy at the counter said that it has a graphite chassis and is very rare. Is this true? By the way, it was made sometime in the late '80s or early '90s. MIKE LONG via the Internet

The RC10 graphite was very popular during the graphite-is-better days of the early '80s. Of course, today this car is very rare. Associated didn't even want to produce this car, but during those days, if you didn't have graphite on your car, you lost a lot of business. People learned, though; the RC10 "tub" was still the car to beat. and the graphite car was discontinued shortly after. It's a great car, and it's even competitive to this day, so don't be ashamed to race it. George

Keep Mother Nature Healthy

I have been racing for about two years now, and a serious issue has come to my attention. For the most part, the environmental issues involved with R/C racing have been avoided. Besides the thousands of obsolete 1700 cells that will flood our landfills, why do we not recycle our shock oils? The small volume that we dump into the

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4806. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

INTERNET ADDRESSES: Frank Masi: trankm@airage.com John Howell: johnh@airage.com. Chris Chianelli: chrisc@airage.com. George Gonzalez: georgeg@airage.com Cindy White: cindyw@airage.com garbage or on the ground surely has added up over the years. Knowingly or not, you have already printed the answer to saving our Earth. Mustard and ketchup make great shock oils, and they're biodegradable. If more people stopped wasting their relish on hot dogs, the world would be a cleaner place.

MORTY ORTEGA via the Internet

Morty, I place my discarded shock oil in a large coffee jar. When it gets full-probably in around a decade, when you consider that I've been dumping shock oil in it for years and it's still only 1/3 full-I'll take it to a gas station so that it can be disposed of properly. Doesn't everyone do that? If not, they should start. Morty obviously cares about our planet, but let's leave the condiments for hot dogs, OK?

Batteries are another issue, and once again, I salute Morty for his concern. You should never throw a battery pack away-very bad for the planet. Dispose of the cells in a container. When the container is full, call your hobby store to see whether it has a recycling program. If it doesn't offer that kind of service, here are a couple of phone numbers all R/C racers should have: the Consumer Recycling Center, (800) 8-BATTERY, and the Dealer Recycling Center, (770) 984-0708.

George

I Want One Just Like It

I would like to buy the nitro sand rail plans that were published in the January 1997 issue. Or can you give me Dale Badger's address because I would like to build one myself? If he has an email address, that would be fine. Any help would be

much appreciated! CHRIS LUKE via the Internet

Chris, I'm sorry to report that Dale has no interest, nor does he have the time, to provide plans for his sand rail. I have received dozens of email messages from R/C'ers who would like to build a car just like his, but he's not interested in sharing the information. Keep in mind that Dale built his sand rail from a single photo that he found in a magazine. We provided at least a dozen clear photos and published information on the buggy's wheelbase and front and rear widths. We also listed the materials he used, so anyone can build one of these rails if he has the skill, the patience and the right tools. Good luck. George

Get That Monster Flying

First, I love your magazine. I have a Nitro Stampede and have just added an MIP tuned pipe. Will I need to make any adjustments to accommodate the pipe? Also, what kind of gearing will give me more speed? More power? SHAUN MARRON Boston, NY

Shaun, the Traxxas Nitro Stampede is an awesome truck. You should see what I did to mine. Actually, you will get to see because my "Project Nitro Stampede" article will be published in the next issue. I added an MIP tuned pipe to my beast as well, and it runs a whole lot faster and much more reliably than before. You don't need to do anything special to your engine to tune it to the MIP pipe. Just find the sweet spot on the high-end needle valve (not too rich and not too lean) as you have done in the past. You might find, however, that you can run the engine a little leaner with the MIP pipe, but

don't get carried away.

As far as gearing is concerned, Traxxas sells clutch bells of different sizes that allow you to change gear ratios. If you want more get-up-and-go, install a clutch bell with fewer teeth (a 1- or 2-tooth drop will make a big difference). If you need more top speed, install a clutch bell with more teeth (again, go up only 1 or 2 teeth). You will most definitely notice a big difference in the truck's performance. Hey, if you want to go ballistic, install one of Traxxas's new .15 engines; they really hum! George

Musclebound

I am very enthusiastic about muscle cars of the '70s. I have looked up and down for those particular bodies, and the closest I have found is the Nostalgic series from Kyosho. Those are all right, but I was interested in Chevelles, 442s and Hemis, and the list goes on and on. If you have any answers for me, I would surely appreciate it. TODD THRIFT Westminster, SC

Todd, you're right; the Nostalgic series cars are great if you're looking for model sports cars, but they don't exactly fit the bill as "muscle cars." Try contacting Bolink R/C Cars at (770) 963-0252, or fax them at (770) 963-7334. They offer a number of models dating from this era that should provide all the scale muscle you're looking for! *Cindy*

Errata

In the "Inside Scoop" section of the March issue, we printed the wrong distributor information for the Tenth Technology XK5 4WD off-road buggy and the DTMi touring sedan. The exclusive North American distributor is Canadian Hobby Craft. For more information on these cars, call (800) 465-6100 or (800) 268-1238. Dealer inquiries welcome. In search of fun and glory, 'cause life's too short to be a sheep

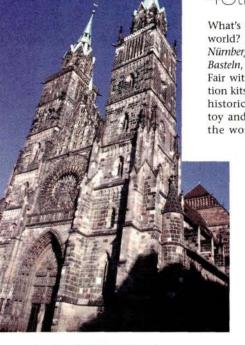


48th Nürnberg Hobby Show

What's the largest toy and hobby fair it the world? It's the Internationale Spielwarenmesse Nürnberg mit Fachmesse Modellbau Hobby und Basteln, or the "Nuremberg International Toy Fair with a special show of model construction kits and hobby crafts." Held each year in historic Nuremberg, Germany's "toy city," toy and hobby manufacturers from around the world gather to display their newest products to prospective buyers and the hobby media, which is where we come in!

This year marked the 48th for the Nuremberg fair, and among the hundreds of displays-everything from dolls and slot-cars to video games-were mixed some of the R/C car industry's biggest international companies. Here's a glimpse of the most noteworthy new goodies from the fair.

photos and text by Frank Masi

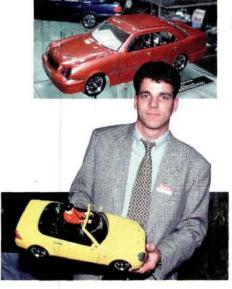








In the Schumacher* booth, we found the very interesting Graziella Wolff-Schumacher's European sales administrator—holding the equally interesting (hey, we're hobbyists, remember?) new Nitro 10 .21-powered touring chassis. Have you ever driven a .12-powered touring car? Can you imagine how fast a .21 must be?!



Beautiful Benzes

What would a report from Germany be without showing some really cool new German cars? This new 4WD touring-car chassis (top), along with these beautiful bodies, were spied in the Graupner* booth. The chassis itself looks to be entry-level grade, but with some neat features such as a fully enclosed belt-drive system. Check out the classic Mercedes "gull-wing" SL, the new Eclass sedan and the trick new SLK roadster (held here by Stefan Graupner).



The Italian company Compagnucci* had on display this really unique 2-stroke,

1.3hp, 2.28cc gasoline engine. Yep, not nitro, but "petrol," as the fashionable Europeans might say. Additionally, this powerplant-designed to fit the company's 1/8-scale F1 chassis—has its own internal, fan-driven cooling system.

Christian Keil GmbH, German distributor of many of America's top R/C lines, had these new Protoform*

touring-car bodies on display. Both the Opel Calibra (left) and BMW M3 were designed to fit most popular 190mm touring-car chassis.

American-German touring-car bodies?



INSIDE SCOOP



Pump your packs

Also in the Schumacher booth were these two new peak chargers. The Hi-Peak (left) is a budget-price, digital peakdetecting charger that's a good alternative to conventional timer chargers. The C.D.A (Charger/Discharger/Autotest) is a full-feature digital charger that will also discharge at 20 amps and cycle (charge then discharge) your pack-all while displaying capacity so that you'll know which of your packs is best.



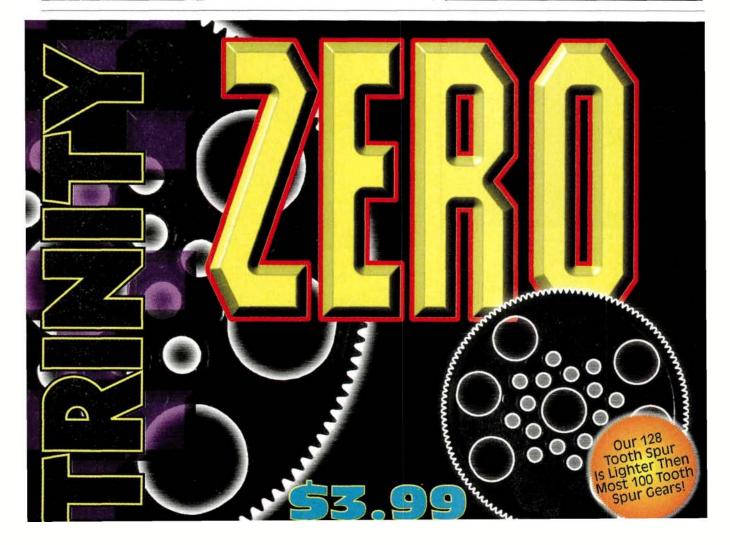
Two new tourers from Tamiya

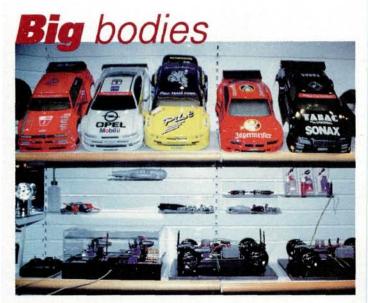
The Martini Alfa Romeo 155 V6 Ti (above) and Opel Calibra Cliff are two new versions of Tamiya's tub-chassis, frontmotor, 4WD, TA03F touring car.





Melanie Fliessbach (you may remember her from "Racy Women" in "Chris's Back Lot," January '97) holds Keil's touring-car tire warmers. Powered by a regular old 6-cell pack, they go over your car's tires to warm them on cold race days for better traction. German racers swear by 'em. Keil informs us that Pro-Line* imports this neat gadget to the U.S.





The German company Prafa* displayed a whole bunch of cool stuff! Among the highlights at the Nuremberg show were these rally- and touring-car bodies for '\abela-scale buggies. Picture a Michelin Pilot Ford Escort rally body on a Kyosho MP-5 buggy! Also in the Prafa booth were on-board starting systems for .12- and .21-size glow engines. Unlike other systems, these don't require a third radio channel.

New **Williams driver** on the block

German slot-car maker Cartronic is branching out into R/C with the release of a ½0-scale, ready-to-run version of the '97 Williams Renault Formula 1 racer under the Tronico* label. To commemorate the release, Cartronic held an exclusive press conference with German driver Heinz-Harald Frentzen, who replaced current F1 world champion Damon Hill at Williams. Frentzen is shown (on right) discussing his future at Williams and details of the new model with a Cartronic spokesman. Special thanks go out to Heiko Faas of the German R/C magazine *Modell-Auto* for inviting our roving reporter to the press conference.





- New Super Low Drag Narrow Tooth Design
 - •Graphite Filled For High Tooth Strength•
 - Super True, Super Light, Super Quiet
- •84 & 87 Tooth Sizes For Losi XX-CR & XXT-CR•
- •95, 100, 120, & 128 Tooth For On-road Racing•
- •Dual Diff Ball Holes For Stealth & Corally Diffs•



INSIDE SCOOP



Thunder Tiger's* Terry Hsu is shown holding the company's newer, better, improved, cooler and much faster Mirage

buggy, which will probably be called the Mirage "V-spec" when it goes on sale in the U.S. The new off-roader still has everything you liked about the Mirage, but the V-spec version has narrower wheels and tires to limit tire expansion. re-tuned suspension for improved handling and a grooved, aluminum chassis with front kick-up for better jumping and rough-track performance. Also look for a full range of graphite parts for the Mirage as well as an optional 2-speed.

Yankee*, the French maker of arquably the world's finest large-scale (1/5- and 1/4-scale) R/C cars, had on display this gorgeous 1/5-scale Ferrari F1 racer. Monocoque chassis, inboard shocks and scale-looking suspension were just some of the features of this



bright-red behemoth. Large-scale racing is very popular in many European countries where there are permanent tracks. Hopefully, it'll catch on in the States-I want one of thesel

Like big rigs? Wedico*, a German company specializing in R/C trucks and trailers, had a huge display featuring some of the

neatest rigs and trailers we've ever seen. There were logging trucks, tankers, livestock haulers; you name it, Wedico had it in their booth! Size? Looked a bit bigger than the Tamiya King Hauler and Globe Liner.

Gross zehn vier Gummi Ente



*Addresses are listed alphabetically in the Index of Manufacturers on page 201.

World Champ switches camps!

This just in: IFMAR 2WD world champion Matt Francis has switched from Team Associated to Team Losi. Matt will now be driving the Losi Double-X 'CR' buggy, Double-XT 'CR' truck and XX-4 4WD buggy. Also, Matt has switched from Reedy motors to Peak Performance EBX motors. See Matt try to retain his title this summer at the '97 IFMAR Worlds at the Ranch Pit Shop in Pomona CA.



World Champ Francis at the '95 Worlds in Japan. Why the switch? Insiders tell us that Matt was just bored and wanted to try something different, and that there are "no hard feelings' between Matt and his former team, Associated/Reedy.



Variable damping without disassembly

Progressive Suspension USA, a company previously involved exclusively in the full-scale suspension industry, is diving into the R/C hobby market with its new EDC (External Damping Control) shocks for 1/10-scale trucks and buggies. Similar to Schumacher's Vari-Shock design, the EDC allows you to alter piston valving (and as a result, the shock's damping) externally simply by rotating the adjuster shaft. For more information, contact Progressive Suspension USA, 11129 G Ave, Hesperia, CA 92345; (619) 948-4012; fax (619) 948-4307; email: progsusp@aol.com; Internet:

http.//www.progressivesuspension.com.

READERS

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers

have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. If we choose to feature your creation, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the seventh annual "Readers' Rides of the Year Contest" in the fall of 1997. The winner will be awarded \$500 and an assortment of electronic R/C equipment furnished by Novak Electronics Inc. Our second and third choices will also receive an assortment of Novak electronic R/C equipment. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!



DOUBLE TROUBLE

Mike Marciano races his Losi Double-X-with all the 'CR' upgrades—and Double-XT 'CR' near his home in Feasterville. PA, and in New Jersey and Maryland. For better on-track performance, he equipped them both with titanium turnbuckles, hinge pins and Trinity purple screws-among other things. He controls both with a Futaba Magnum 3PJ radio. With good looks like these, they must be concours winners.

WEEKEND TOURER

Calvin Lehman of Bremerton, WA, wrote to tell us about the OFNA Pirate 10 R he hopped up with features that include a blueanodized MIP tuned pipe and manifold, Dynamite turbo flow and air/fuel filters, a Parma underbody antenna and an Associated rear spoiler. He powers it with a .15 OFNA "Black" engine and controls it with a JR Remote Control Propo Alpine PCM transmitter, an Airtronics 94102 steering servo and a JR NES-507 throttle servo. For scale looks, Calvin customized a cell-phone antenna on the metallic burgundy Mercedes body. Looks great, Calvin!



BEGINNER'S LUCK?

Michael Bixler of Enid, OK, started in the novice class last October, has progressed into sportsman and might soon move into sports truck. What has brought him such immediate success?—his obvious driving skill and well-set-up car. Michael's Associated RC10T2 is equipped with MIP CVDs and gold shock shafts, Robinson 'Absolute' spurs and adapters, Lunsford titanium hinge pins and turnbuckles and RPM shock pistons and ball cups. He powers it with Reedy Firehawk stock and Motor Man 14-double motors, Badd Boyz batteries and aluminum dress-ups and controls it with a



Futaba Magnum Jr. radio and Novak Cyclone speed control. Keep up the hard work. Michael. It's obviously paying off.

COCA-COLA CLASSIC

Christian Kaps wrote to tell us what the "crazy guys in Austria" are doing in the R/C world. He constructed this car from what he calls a "pencil-box in Coke design" and added searchlights and gear made from model ship parts and sheet metal. The "hotrod" tears up the road with Ayk's RX 3000 tires and rims. Ingenuity is alive and kicking, apparentlyoverseas as well as at home.



READERS' TICES



CUSTOM-CRAFTED CRUISER

Garrett Binder started with Tamiya Hi-Lux and Kyosho GP-10 parts, added a recycled 3x5-inch aluminum plate for a chassis and ultimately-after "a few surface-to-air launches followed by a spectacular free fall"-created an RWD sports car with forward-mounted nitro engine. He topped his ride off with a Tamiya 1/8-scale Toyota Supra body with racing stripes, and he powers it with an O.S. .12 CZ-Z engine with KO Propo's onboard electric starter. A worthy addition to this page!



BARBED-WIRE BUGGIES

To kill time during the frigid winters of British Columbia, Canada, Dean Norlin and his friend Wade head out to the frozen lake with their well-equipped buggies. Wade's "icemodified, trash-mobile" Grasshopper has a 17-turn Trinity motor, full ball bearings and wood-screw-studded tires (kids, don't try this at home!). He controls it with a Novak Rooster speed control and an Airtronics XL2P radio. Dean's Team Losi Double-X gets its steam from a Trinity 11-turn motor and full ball bearings; it's controlled by a Novak 410 M1 speed control and Rival 2PS radio.

FIRST RIDE

Kristoffer Klemm races with his brother and friend around the neighborhood because the track nearest to his home in Nittedal, Norway, is an hour away. It's all right though, he tells us, as he is still practicing with his first truck. Powered by a Kyosho GT 15S CR pull-start engine, his Schumacher Nitro Storm 2000 is hopped up with full ball bearings, blue-anodized aluminum chassis and long Vari-shocks. Kristoffer guides the Storm with a Hitec Ranger-II radio and stock servos for steering and throttle. Once Kristoffer has mastered his driving skills close to home, he thinks he'll join a club to compete! Good luck, Kristoffer.



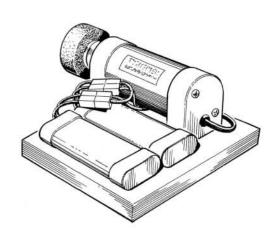
WIDE RIDE

Steve Baugrud widened his Tamiya TA02 Chevy S-10 Stadium Truck by 2 inches with a widening kit that included Tamiya Manta Ray A-arms, shocks and bones. He powers it with a Reedy Firehawk motor and controls it with a DuraTrax Blast ESC and a Futaba 2PB radio; he topped it off with an HPI Acura NSX body. Steve tells us that it is almost as big as a Tamiya Blackfoot and handles great because of the ride height, width and 4WD configuration.





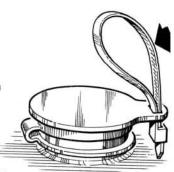
Jim Newman



Cool Pull

Pull a small cable tie through the tab of your gas cap to keep your knuckles away from the hot engine and speed up refueling.

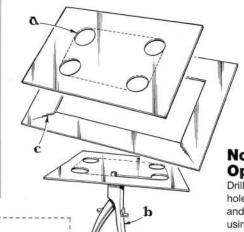
BRYAN MORAST Susanville, CA



Gas Car Starter

Screw a starter to a 1/2-inch (13mm) ply base large enough to clamp to a low bench. Attach 10 1200mAh or larger cells with Velcro®-brand fasteners and slip a rubber donut or old tire on the starter cone. For even greater usefulness, line a foot switch up with the regular squeeze switch on the motor.

BEN BAKER Pittsburg, KS



No Crack **Openings**

Drill 1/4-inch (6mm) holes in each corner (a) and join each hole using a Radio Shack nibbler (b) to avoid cracks that can occur when cutting openings in square-cornered body shells (c).

JEFF DILLON Reynoldsburg, OH



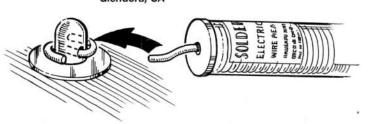
Use hot glue or screws to attach a pair of alligator clips to a short piece of 2x4-inch (50x100mm) wood. They will securely hold wires or other small parts for soldering.

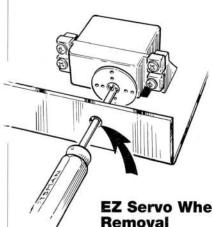
ERIC REYNOLDS Vista, CA



A short piece of solder twisted around the body post will work as a spare body clip until you can replace it. NICK HECHT

Glendora, CA





EZ Servo Wheel

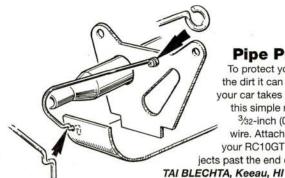
Drill a screwdriver access hole in the side of the RC10 chassis tub so that you can remove the servo wheel without removing the entire servo.

DAVID STAMPER Macon, GA

(Continued on page 39)

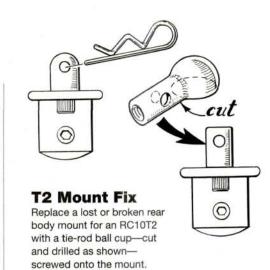


(Continued from page 34)



Pipe Protector

To protect your pipe from the dirt it can collect when your car takes a tumble, bend this simple roll bar from 3/32-inch (0.8mm) music wire. Attach it to the rear of your RC10GT so that it projects past the end of the stinger.



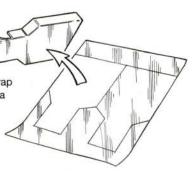
Magnetic Caddy Driver

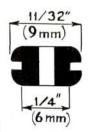
To magnetize your screwdriver, pass over its shaft with a magnet a few times; rub in only one direction. The magnetism will help keep screws in place when you are starting to thread them and will also allow you to hold small steel objects on the screwdriver so they don't get lost. MARK MENASHA, Stirling, NJ

LUKE SHORT, Houston, TX

Protect Your Bottom

To protect the underside of your chassis from scrapes and scratches, cut oversize pieces of shelf paper and attach them to bottom of your car. Wrap the paper up the sides a short distance. If you run on a really rough track, use two layers of paper. RICHARD ARPIN, Winnipeg, Manitoba, Canada

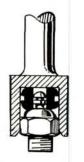




It's a Hold-up

Jam a rubber grommet of appropriate size onto the end of your glow-plug wrench. When you push the wrench onto the plug, the grommet will grip the plug post and lift it out of the head recess after it has been unscrewed.

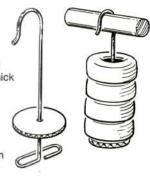
ARCHIE TIMMONS, Milwaukee, OR



Hanging **Tires**

Bend coat-hanger wire as shown, and slip a thick cardboard or plywood disk on the shaft. Use this device to hang spare tires in a dark closet during the "off" season to prevent them from being affected by UV rays.

SHAWN McCABE, Mulberry, FL



Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.

by Doug Mertes

Troublesome Ball Joints

I've been racing R/C cars for about five years, and I own a Kyosho Pro-XRT. Its awesome SST Super Sprint transmission is so quiet that one guy at my track says it sounds like an on-road car! It's a very fast truck (although it can be a hassle to get parts), but when I crash into the curb, the ball cups pop right off and I can't finish the race. I have upgraded to titanium turnbuckles and RPM ball cups, but that hasn't solved my problems. Can you help me? DAVID MOON Sacramento, CA

If you race in Sacramento, David, I bet you run at the Hobby Warehouse track. I've been there, and it's great-indoors, smooth clay surface and lots of twists and turns. It seems to me that they use large-diameter PVC piping for their track barriers, and that stuff can be murder on a truck's steering linkage and camber links! I've found that Kyosho links pop off much more easily than most other brands, even if you don't remove them very much for maintenance. Installing and removing eventually stretches them so much that they'll come off very easily, no matter which brand they are, but if you use turnbuckles, that, most likely, isn't the problem. You say that you use RPM nylon ends; they're as good as anything else on the market, so that's not it,

either. When you changed to RPM ball cups, did you change the ball studs? If you didn't, that could be the reason they pop off so easily. Metric balls are often a smaller diameter than their SAE counterparts. If you haven't done so already, try a set of Robinson titanium

ball studs or MIP B.J. ball ends. If you need new ball cups, Robinson's new adjustable ball cups look like they'll

racing friends can't resolve. give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

If you have a technical problem that your hobby shop or

reduce slop and compensate for wear. minning If you've already changed the ball studs, it's time for the heavy hardware-ball links, or captive ball ends. Order six pairs of Rocket City no. 87 ball links, and replace all the ball cups and studs. Because these bolt on, they'll never come loose, unless you rip them out of the spindles or carriers.

Need More Juice

I have an RC10 that I've changed into an RC10T, but I've kept the tranny the same. I don't think my charger—a Panda AC/DC charger that came with my car kit-is charging the way it used to when it was new. I have four different battery packs, from 1300 to 1700mAh ratings. They aren't too old, but I have changed the battery plugs from Tamiya to Litespeed connec-

tors. I know a battery is supposed to be charged when it gets warm.

but it takes the charger about 30 to 45 minutes to charge a battery pack, and it doesn't get very warm. After I run the pack, it's almost too hot to touch! Isn't that supposed to

mean that I'm using the wrong gears? I went through the math, and my gearing matches the suggested ratio. I use an 85tooth spur gear with a 19tooth pinion, a Green Machine 2 motor, a Rooster ESC and a Futaba radio system. Are my batteries messed up, or is it

I didn't see

a thing...

my charger? Did the wrong gears ruin the batteries so they won't charge correctly? I need all the help you can give me. Thanks for

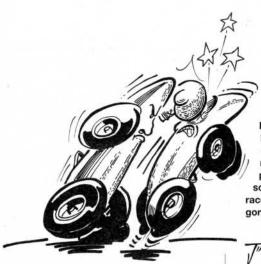
the great magazine, especially the wonderful drawinas. **GREG BUCUR** Grayslake, IL

1 NEWMAN

You know, Greg, seven or eight years ago, we were all converting off-road buggies into off-road trucks, and many of us had the same problem you're experiencing. When you use a stock motor with those big truck tires, gearing is critical, and you can indeed burn up your packs if you don't pay attention. You mention that you didn't change the tranny, and that makes me wonder whether your RC10 isn't an older one that predates the Stealth transmission. If so, you're overgeared by a couple of teeth, and that could be your problem. On a Stealth-equipped car, that 85/19 combination yields an 11.86 ratio, which is a piece of cake for any stock motor. The older tranny has a 1.85 ratio, however, so the 85/19 gears give you an 8.27 ratio, which is way off. In a truck with a stock motor, you want to be around 10:1, and that calls for an 85/15 setup. If you do have a Stealth transmission in your car/truck, then your hot battery problem is caused by

excessive drag somewhere in the driveline. Take out the motor and see how easily the drive train spins; take it apart one component at a time until you find the culprit.

As far as your charger is concerned, many older AC/DC chargers are set to charge packs at a very low rate of only 2 to 3 amps. That means it could easily take a half hour or more to charge one of your packs, especially the 1700mAh ones. Even very good cells take 24 minutes or so to charge at 6 amps. To cut your charge time down, pick up an inexpensive DC charger, or look at some of the newer AC/DC models with variable charge rates. You might also ask a friend with a good peak-type unit to crank up your batteries and see how well they take a charge. I guess that your batteries are OK and that the charger is just a little weak.



Stop Hacking Or Start Stripping

A few months back, I bought a Tamiya TA02RS. I have since added a Midnight motor, a Tekin Formula 10 ESC and Airtronics radio gear. The problem is that pressure plate B on the rear diff stripped, and the shaft on the rear long gearbox joint broke. I installed a new, aluminum, pressure-plate set, but pressure-plate B stripped again. What causes this and what can I do to fix it? VICTOR LAPY Woodside, NY

Victor, you've just got to stop slapping the wall like that! Seriously, I guess that your two problems are not at all related. Those hardened drive joints can split and fracture in a heartbeat if they smack into another car or a track barrier at high speed, and that's probably what happened to you. It may have cracked several days, weeks, or races before it finally spread and came apart. As far as your pressure plate goes, well, you almost stumped the panel on that one! I asked a bunch of my friends (we race TA02s together all summer long), and nobody had ever had that pressure plate strip. I took one apart on the bench in the secret underground laboratory to see how the threads could be damaged, and I may have solved the mystery. Take yours apart again and double-check that you are stacking the thrust-bearing and concave washers properly. If they don't fit the internal diff shaft correctly, they'll prevent it from seating all the way into the differential. Because it feels like it's not tightening, you just keep on wrenching, but the shaft has bottomed out in the plate. Presto, strippo; no more threads! Pull out your manual, carefully assemble the diff parts in the proper order (pay special attention to the internal dimensions of the washers and springs), and you should be good to go-literally!

Mr. "M" Got You Down?

I'm not a newcomer to this hobby; I started racing a 10L almost five years ago, and never (until now) have I had a problem that couldn't be solved. This year, I decided to race in the M-chassis (Mini) category, but from the beginning, I've always had problems with

the steering, especially with the car pulling to the right

under acceleration. If I trim the servo to go straight when I accelerate, the car veers to the left when I let go of the throttle. Although many of my friends have this problem and have decided to try a different class, I'm stubborn, so I tried to eliminate this. At first I thought it was caused by too much slop in the steering, so I installed Tamiya's steering upgrade. I also tried replacing the stock shocks and swaybars and installing harder arm springs and a ball differential. I tried tuning it by lowering the suspension and trying different toe-in and toe-out settings. Nothing has worked, and at this point, I'm starting to wonder whether there's something wrong with the car or with

this problem?

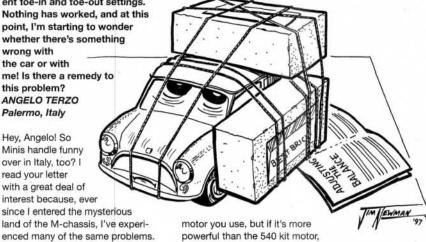
ANGELO TERZO Palermo, Italy

Hey, Angelo! So Minis handle funny over in Italy, too? I read your letter with a great deal of interest because, ever since I entered the mysterious land of the M-chassis, I've experienced many of the same problems. These can be difficult buggers to figure out; let's see if we can help. You mention that the car pulls to the right under acceleration. I'd bet that it's worse when the track has a lot of traction, right? And the car probably shoots off in the wrong direction in tight turns, especially lefthanders. I'd start by checking the car's weight distribution. Make sure that the weight is evenly distributed from left to right, which may mean moving the speed control, the receiver, or even the servo (some

hotshot racers in this area move the servo to the very back of the chassis and use a longer steering rod). Also, be careful not to place your electronic gear high up on the chassis, because this will make it "tippy."

Next, take a close look at your tires. Tamiya makes slick racing tires in hard and soft versions, as well as tall and short radials. If your softies are up front, and you have hard ones out back, that could also be part of the problem. Because you've installed the ball diff from the Manta Ray, make sure that it's tight, tight, tight! A loose diff up front (and often the gear diff, if not packed with heavy grease) will send the power to the wheel with the least traction and make the car wobble as traction swaps from one side of the drive train to the other. One hot tip here is to replace the entire thrust-bearing assembly with a single shielded 5x11mm bearing. You can crank these down really tight and still get exceptional diff action.

Finally, you didn't mention which



that's also part of the problem. The stock chassis just wasn't designed to put down more power than the kit motor, and all sorts of handling gremlins come out of the toolbox when we put in too much of our good friend Mr. Horsepower. You may just have to use a more delicate throttle finger. All of the other stuff you've installed will make your car run like a rocket when you get the weight distribution, differential and tires sorted out. Good luck!



More Tips from the Underground Laboratory

GRAPHITE AND GRAPH PAPER

MANY R/C Car Action readers make their own parts when aftermarket manufacturers don't produce exactly what they require for a particular application. Whether it's an unusually shaped shock tower, a chassis plate, an upper deck stiffener, or simply some small bit or attaching bracket, fiberglass-reinforced plastic (FRP), G-10 fiberglass plate, or woven graphite seem to be the materials of choice for most would-be parts designers.

Unfortunately, the same slick, hard surface that makes these materials so desirable also makes it darn near impossible to draw designs on them or mark hole locations with any sort of precision. A parts maker myself, I've tried many solutions over the years: Sharpie fine-point black markers, awls, china pens, etc. None of these really solved my problem, because the lines and marks would either smear or disap-

pear in the flurry of graphite or fiberglass dust that arose as soon as I started to cut or drill the stuff.

Recently, however, one of the members of an Internet newsgroup that I regularly visit (rec.models.rc.land) posted an article mentioning that he was trying to locate some graphite sheet for use in a robotics project. A couple of participants pointed him in the right direction, but Larry Atwood Sr. took things a step further. He suggested a method of resolving the pattern-making issue that was so perfect I had to pass it on!

Larry suggests that you spray the surface of the graphite or fiberglass sheet with some 3M adhesive. Then, spray just a light coat of it onto a sheet of graph paper—the kind you can find in any office products, architectural, or art-supply store. After allowing several minutes for the glue to dry, lay the sheet of graph paper on the sheet



Use some 3M spray adhesive to glue graph paper to flat fiberglass or graphite, and you'll be able to make custom parts that look like they came from the factory.

of material and press it out smooth and wrinkle-free. Presto! Now you have a clean paper surface on which to draw the design of your world-beating R/C part, and because it's imprinted with graph lines, you'll also be able to make sure that everything is nice and straight and that all of the holes are properly spaced. When you have cut and shaped the piece, you can remove the graph paper with a weak solvent such as lighter fluid or motor spray. Pretty neat, eh?

IS YOURS WET AND SAGGY?

I've always been enthusiastic about keeping the motor in my car as cool as possible while I race. Heat is the enemy of all electronic devices, but DC motors suffer a drastic performance reduction when they get hot. Touch a motor as it comes off the racetrack after a 4- or 5-minute run, and if you're not careful, it will

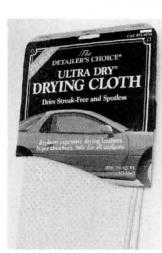
blister your finger unless you used some sort of motorcooling device. I've tried many motor coolers, from machined clip-on

Natural chamois used for a motor coolant works well, but it stretches and drags after lots of use. This synthetic product—called Ultra Dry—holds as much water as natural chamois, but it won't stretch out of shape.

aluminum ones to those with some sort of voodoo chemical inside a canister that's strapped to the motor can like a piston cylinder. For some reason, however, I keep coming back to a simple water-soaked motor wrap; that's probably because it works so well.

It seems to me that a piece of wet chamois wrapped around the motor can keeps it cooler-and prolongs its life-better than any of the other more elegant, attractive, or elaborate things I've tried. The problem, however, is that chamois stretches and sags after a while. Even if you soak, pre-stretch, and dry the chamois before you cut and glue it into shape, the ring elongates after a couple of dozen rewettings, and it won't do the job as well as it once did. I bought 2 square feet of chamois at an auto parts store for about \$7 a couple of years ago; that was enough to make 60 or 70 coolers, so I had enough to last me for several years. Still, I figured there had to be a better material. And there is!

Ultra Dry is a cloth-like material sold by Clean Rite Products, and you can find it in many auto parts and discount chain stores (I got mine at Wal-Mart). It's meant to be used just like chamois for drying cars and trucks, so it can take the abuse of frequent wet/dry cycles. It's a little less expensive than chamois, but best of all, it doesn't stretch out of shape when it's wet. I cut a piece 1 inch wide and several inches long, wrapped it around the can of one of my Mabuchi 540 motors and used thin CA to hold the 1/4-inch overlapped ends together. After a couple of minutes of drying, the wrap was ready. I've run it in one of my Formula 1 cars for almost two months, and it's still as tight as the day I installed it. (No plastic animals were injured during the manufacture of this product.) Contact Clean Rite Products Inc., 600 Wharton Cir. SW, P.O. Box 44709, Atlanta GA 30378; (800) 241-3808.



VOLTAGE! I NEED MORE VOLTAGE!

You probably read about adapting Ni-Cds to transmitter use in the October '96 issue of *R/C Car Action*. The point was that Ni-Cd batteries produce only 1.2 volts per cell, not the 1.5 volts or more that alkaline cells produce when

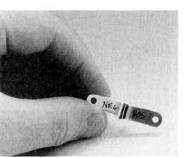
new. I discovered that some radios, particularly feature-laden FM and PCM units with multimodel memories, were real amp hogs. Unless I charged the cells in my JR-756 the night before a race and kept it plugged into the charger between

charger between heats, I would hear that "beep, beep, beep" that signals low-voltage levels sometime during my Main. This was annoying, to say the least. I went back to alkaline batteries, but the cost and hassle of replacing them every couple of weeks (and always having to keep a spare set on hand) was wearing on my mind.

I resisted the idea of going to a 9- or 10-cell pack because I figured that I'd have to hang a set of batteries off my belt while I raced, and that seemed kind of, well, geeky. This is what I did instead:

DOC MERTES

Notice the two extra cells on the side of the radio case? This is a tidy way to add the voltage many radios need to perform properly when using Ni-Cds, without resorting to an auxiliary battery pack that has to be carried around. I took an old 4-cell AA battery box (the kind that comes with just about every radio sold), and I cut two cells off it. I made sure that the two remaining cells were connected in series and had wires attached to each end of the circuit. I secured the modified battery box to the



If your transmitter uses prongs or contacts instead of wires and a plug, this simple connector will allow you to add the cells you need.

radio's battery door with double-sided tape, and I drilled a small hole in the door that would allow the wires to pass through. I then cut one of the connector wires off the radio's internal battery box and—observing correct polarity—spliced the additional batteries into the circuit. Now I had a 10-cell AA-size Ni-Cd, 12V source of power for my transmitterwithout the dweeb pack. It's simple, and it works. The only warning is that you shouldn't turn your radio on immediately after taking it off a long, overnight charge. Ni-Cds tend to put out more than 1.2 volts when they've just been charged, and some radios may not take kindly to getting a 14V or 15V jolt. After an hour or less, the cells will be back down to the 12V or 13V level-perfectly safe for all transmitters.

If your radio's battery pack uses prongs and contacts instead of a wired connector, you can make an insert to go between two of the cells in the battery box. Two thin battery bars bent into an "L" shape and separated by a piece of thin Lexan for insulation will open the circuit. Hold the homemade connector together using small pieces of doublesided tape. Again, observing correct polarity, solder one of the wire leads from your additional two cells to each of the battery bars. You may have to tape everything in place with some thin Mylar or battery tape to ensure that the connector doesn't work its way out from between the cells, but this method works really well. Just be sure to charge your cells for 10 to 16 hours before you race, and you should never have to buy alkaline batteries for your transmitter again!



When you look at the lineup of most races, it's no secret that Team Novak dominates the field. However, there is more to winning races than just having the best speed controls.

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CABLE-TIE CONUNDRUM

I go through a ton of nylon cable ties in the Secret Underground Laboratory, sometimes as many as a couple of dozen in a week. I've used all sorts, from the colored kind that come in kits sold by the communications industry (they work well, but they're kind of short), to bulk packages in weird colors that I've found at flea markets. I really like the clear ones that come in Tamiya* and Kyosho* kits (they're really strong, and they don't clash with colored ESC or receiver cases), but I've never been able to find them in any sort of quantity.

My wife gave me a container

of 650 translucent white cable ties that she bought from a machinist supply firm called MSC. These ties are identical to the ones you'll find in premium kits, they come in three sizes (mostly the 7 inch length that we R/C types need the most) and, best of all, the entire package costs under 7 bucks! For just about a penny a cable tie, I'm set up for an entire year. Contact Catamount Mfg. Inc., a division of Thomas & Bettes Corp., Orange, MA 01364.

REAM-O-RAMA

For those who are unfamiliar with this nearly indispensable tool, it's a series of tapered blades mounted on a T-shaped handle, and it's narrower at the tip than at the top. It's ideal for enlarging small holes to precisely the size you need without having to wiggle a drill bit around. Since it's not electric and it's flat, it's easier to pack in your pit box than a rotary grinder such as a Dremel* tool. This one is an ½- to ½- inch model sold by MSC (part no. 02058774), and it costs less than \$20. Horizon also sells a tapered reamer under its

Lots of racers use these to produce body-post holes of the proper size, or to move their transponder hole to a

Dynamite label.

more advantageous position when friendly Mr. Drill is still at home on the bench. This tool (the edges are sharp!) is meant for soft plastics such as Lexan, wood, light-metal alloys, such as thin aluminum, and nylon, so you wouldn't use it on steel or cast-metal parts. On the other hand, it's perfect for reaming out the bearing-socket holes in the height adjusters found in most pancar kits until they're just right—tight enough to keep everything snug and straight, but not so tight that the holder squeezes the outer bearing race and creates friction and drag.

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.



by George M. Gonzalez

Street's Neat

HIS MONTH, we'll show you how to create stunning "street" bodies with just a single can of spray paint and a fine-point detailing pen. Here in the U.S., the most popular sports coupe has always been the Chevrolet Camaro Z28. The new Acura Integra Type R illustrates Japan's

slightly different approach to the highly contested sport coupe class. Fortunately, thanks to Associated Electrics* and Frewer Intl.*, both of these cars could be re-created 1/10 scale.

The Associated Camaro Z28 body (part no. 6136) for the company's Dual Sport (DS) parking-lot racer faithfully captures the sleek styling and eyecatching lines of the Chevy Camaro. An optional decal set (no.

8803) provides all the Chevrolet



The Camaro Z28 (right)

takes no prisoners. The Integra Type R (above) is a wolf in sheep's clothing. OK-the Camaro has 325hp; the Integra has 195hp. Which car do you think goes faster in the real world? Well, the Z28 will feed taillights to the Integra going from zero to 60mph and in the quartermile, but on the freeway, the Integra will catch up and will probably wave goodbye to the popular American muscle car.

logos, Z28 emblems and front and rear illumination that's needed to create a convincing 1/10-scale replica.

Frewer's commitment to excellence is evident in the new Acura/Honda Integra two-door body (no. FR-4012) that was designed to fit most narrow (190mm) touring cars. The Integra features molded-in detail that's as good as, if not better than bodies costing twice as much. The body also includes a decal set that has all the Honda and Acura logos, front and rear illumination, door handles and front grill.

Thanks to these companies, creating stunning street machines

any easier. I decided to paint the Camaro with Pactra* Bright Red spray paint because red happens to be the most popular color for the Z28. The Integra Type R is available only in white, so I used Pactra Sprint White spray paint and achieved great results.

Believe it or not, the Camaro and Integra shown here were painted using a single can of paint and then detailed with a Trinity* Ex-Pen. Even though these paint jobs are extremely easy to replicate, I decided to pass along a few tips that should make the process much easier.

couldn't be

Preparation

Clean the Lexan body with warm water and a mild dishwashing detergent, then dry it with a paper towel (not a cloth towel because it leaves behind lint that could easily be overlooked and later discovered after the paint has been applied). Evaporate any leftover moisture with a hair dryer. Before you paint it, it's

a good idea to trial-fit the body on the chassis and mark the outside to indicate where the bodymounting holes must be drilled.



COOL NEW



- Check out Protoform's* new 95 Courage C-41 body -part no. 1605 (above right). It fits most 1/12-scale on-road cars and is perfect for all you open-cockpittype racers. Check out the driver's helmet and cool windshield. Of course, the helmet could be painted to match the body trim, and you could even detail the cockpit for that true concours touch. This particular Courage was painted by the airbrush wizard himself, Scot Bich of Bich'n Bodies*.
- Team Associated just released these awesomelooking hubcaps (left top) for the Associated Dual Sport parking-lot racer, and they come in gold, black and yellow (part nos. 8877, 8878 and 8879). Now you can match your wheels to the body trim without having to paint the hubcaps yourself.
- Also new for the Dual Sport are these interestinglooking RPM* wheel knock-offs (left bottom) in

chrome or gold (nos. 8072 and 8071). Give your DS wheels that European flair, and give your ride the final finishing detail that was missing. Each package comes with three different styles (12 total), so you can change the look of your car without buying additional sets.



Decals like these make detailing much easier. The Frewer decals are included with the Integra body. The Associated decals are optional, but well worth the small investment.

2 Window outlines

To make window masking easier, use a fine detailing pen such as Trinity's Ex-Pen to outline the windows on the outside of the body. This will make trimming the window mask much easier because the lines will

show through the masking tape on the inside of the body and provide guidelines for easy trimming.

This Frewer Integra body is ready to paint. Remember to spray on thin coats.



3 Masking

When it comes to window masking, I have one simple rule: I use only 3M masking tape because it doesn't leave a sticky residue when you remove it, and it resists paint bleeding better than any other masking tape on the market. It's sold in rolls and comes in several widths; I always buy the 2-inch roll because that size provides more coverage, and that saves a lot of time.



Use high-quality masking tape to mask the inside of your Lexan body; 3M brand is by far the best. Pick up the 2-inch-wide roll because it makes masking much easier.

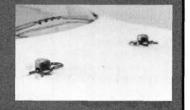
4 Trimming the mask

For every masking job, I always use a sharp new hobby-knife blade because it will cut masking tape more easily and more cleanly than a used blade. If you followed step 2 and took the time to mark the window outlines on the outside of the body, all you have to do is run the blade along the lines then lift off the excess tape.

TIP OF THE MONTH

If tall, ugly body mounts protrude from a body shell, it looks bad and ruins your car's scale appearance. How would a full-size car look with pairs of 6-inch posts sticking out through the hood and the rear window?—pretty silly. Your R/C bodies should each have their own custom body mounts, and you should pick up additional sets. Also, buy some small black body clips like those used on Tamiya models;

they aren't as noticeable as the larger ones, and they really do a great job of securing the body to the chassis.



5 Painting

I have one simple rule for painting Lexan bodies: spray on several light coats of paint instead of a single heavy coat.

Spraying on a heavy coat increases the chance that the paint will run and bleed through the masking tape. A heavy coat also takes much longer to dry and adds unwanted weight to your car.

6 Trimming the body

Use a pair of curved Lexan scissors to trim the body. These scissors facilitate trimming considerably—especially when it's time to trim the wheel wells and other contoured parts. When you've finished trimming, use a Dremel* with a cylinder-shaped sanding bit to make the wheel wells perfectly circular. Finally, sand the edges of the body with some fine-grit sandpaper until they're smooth to the touch



Use a Dremel tool to make the wheel-well openings nice and round. To protect yourself and those much appreciated turn marshals, finish the job by lightly sanding the cut Lexan edges (a Lexan cut hurts more than a paper cut, so take this extra step).



Detail lines really enhance a scale appearance.
Use thin lines for the doors, hood and trunk
and thicker lines on the window moldings.

7 Adding detail

The last step is to add detail lines to the body to add depth and to make it look as though the doors, windows, hood and trunk actually function. The Associated Camaro and Frewer Integra bodies shown here have molded-in lines for the doors, windows, trunk and hood. The Integra is more detailed than the Camaro, so you could make the body look even more convincing.



Trinity and Parma make detailing pens that have two tips—fine and medium. You could also use a permanent marker like the True Value pen and achieve excellent results.

Use a permanent marker such as the ones Trinity and Parma offer for detailing Lexan. They have two tips—fine and medium—so they're perfect for most R/C detailing. You could also use a hardware-store fine-tip permanent marker; I like the True Value marker because its tip is just the right size—somewhere between fine and medium—and it lasts a long time.

Detailing is easy: follow the lines molded into the body. If you want perfectly straight lines, use masking tape as a ruler: on the outside of the body, stick a long enough piece of it, positioning one straight edge against the molded-in detail line. Then use the tape as a guide to make straight lines. If you make a mistake or you aren't satisfied with the results, wipe off the accident with *Bolink Body Wash, Trinity Body Blast or a motor spray that's safe for plastic. Use the fine tip of the detailing pen for the doors, trunk and hood; use the medium tip for the window molding.

That's all folks. I hope these tips help you create a magnificent "street neat" body of your own. As you can see, creating spectacular bodies like these is painless and even fun. And remember to keep your ride clean and in show condition; after all, R/C cars are actually models even though they happen to run!

Well, until next time

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.

PRODUCT WATCH

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.

The icons below denote products reviewed and the page on which each appears.



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Compression
Gauges



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58 Novak R/C Analyzer



58 Trinity Off-Road Tire Balancer

Engine Compression Gauges

TESTING DYNAMITE'S AND HOBBICO'S GAUGES

HAT, EXACTLY, is compression? No, it's not the feeling in the lower part of your stomach that you get after you eat a spicy burrito. Compression occurs in your engine when the piston pushes upward and squeezes the fuel/air mixture, causing the atmospheric pressure within the engine to rise. Compressing the fuel mixture? Atmospheric pressure?

Sounds complicated—you probably liked the burrito answer better—but it's really not that difficult to understand. And if you want maximum life from your engine, you'll want to stay alert to changes in compression, or you'll be up all night with stomach pains from wondering why your engine won't keep running. A compression gauge will make those measurements for you.

Before we get to the gauges, here's a little test for you to try. Put a few drops of after-run oil in your engine. (If you recently ran your engine, there should be enough oil left in it for this experiment.) With the glow plug still in place, turn the flywheel or pull the pull-starter cord. Feel how difficult it is to turn over the engine when the piston reaches the top of the sleeve and is forced back down by pressure. You'll actually hear and feel a pop.

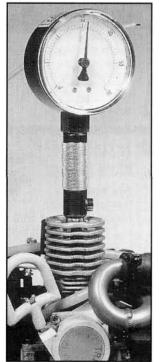
This pop is also the result of friction caused by a tight-fitting piston and sleeve. Some engines can be turned over by hand without difficulty or much of a pop; it means they don't have much compression. Among the explanations for this, the first and most common is that the piston and sleeve inside your engine are so worn that they no longer form a good seal. This allows air to escape between the piston and sleeve and results in a loss of compression. Second, the number of head shims used in your engine may need to be reduced to raise the compression level. Third, atmospheric conditions (barometric changes, heat, humidity, etc.) may not allow enough compression.

DYNAMITE AND HOBBICO COMPRESSION GAUGES

Auto mechanics use compression gauges to diagnose problems with ailing powerplants, so why not use them for model engines? Dynamite* and Hobbico* have addressed this issue with model-engine compression gauges that perform the following functions: they monitor and evaluate engine condition; they test the differences in cylinder compression caused by adding or subtracting head shims; they determine the possibility of engine failure; and they test the effects of atmospheric changes on your engine.

Both the Dynamite and the Hobbico gauges will work on .10-size engines and larger, with \(^1/4x32\) glow-plug threads. Dynamite's gauge (DYN2514) measures compression values of 0 to 160 pounds per square inch (psi). Hobbico offers two gauges: one measures from 0 to 60psi (HCAP2600), and one measures from 0 to 160psi for .60 engines and up (HCAP2601). If you have a gas-powered engine, no problem; Hobbico offers a gasengine adapter.

Both the Dynamite and Hobbico gauges have easy-to-read numbers, are well-machined and provide accurate readings. Dynamite's gauge is better suited to "dumb thumbs" like me. It has a protective rubber case around it—just in case it's dropped. It also features a swivel head and a rubber O-ring that provides a good seal between the gauge and the head. Hobbico's gauge features a highly polished stem; its fiber washer provides a tight seal for accurate readings.



Just screw in the compression gauge where the glow plug is normally installed, yank on the pull-starter cord a couple of times and presto!—an instant reading. Test your engine compression when it's new, and you'll know the optimum compression; use this reading as a benchmark for future tests.

COMPRESSION COMPARISON

To get accurate results from any compression gauge, it's a must to take a base reading on a new engine. You'll need this reading to evaluate your engine as it becomes worn with use. Before you take the base reading, break in the engine for a tank or two. You may take a compression reading when the engine is cold. In fact, Hobbico recommends that you do it this way. Dynamite, however, suggests that you take the reading right after the engine has been run, while it's hot and its parts are expanded because of the heat.

Dynamite says that you'll get a more accurate reading on a hot engine. (Continued on page 56)

PRODUCT WATCH

Engine Compression Gauges

(Continued from page 54)

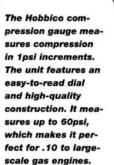
To check your engine, screw your compression gauge into the hole where the glow plug would normally go. To take the reading, either pull the pull-starter as you usually would, or run the engine on your starter box for 4 to 5 seconds. The carburetor should be fully opened and the fuel line should be detached; nothing should block the exhaust. Now you should take a reading.

For my test, I used a newly rebuilt O.S.* CZ-Z engine. On the Dynamite gauge, I had a reading of 70psi, and on the Hobbico, it was 35psi. That's a big difference! "Houston, we have a problem!" I called the manufacturer for an answer. They explained that both readings were correct. I asked how that could be. The reason has to do with the volume of air inside the compression gauges' valve-stem chambers. Dynamite's gauge has a smaller chamber that provides a larger scale for readings. Hobbico put a larger chamber on its 0 to 60psi gauge, and this provides a smaller scale.

A base-line reading will help to determine later whether there is a problem with the engine or adjustments need to be made—like adding or subtracting head shims. To assess the effects of playing with the shims, I bought an extra head shim because my CZ-Z came with only one. When I added the shim, the compression dropped by 2psi on both gauges. This will have a major effect on the engine performance.

For its engines, Traxxas* supplies two shims—one thin and one thick. On hot, humid days, the engine runs better with just the thick shim; this raises the compression. (Remember: you must have at least one shim to act as a gasket between the head and the cylinder.) Because I had taken a base-line reading on my new O.S. CZ-Z, I pulled out an older O.S. CZ-Z that did not run properly; I suspected that it needed a new piston and sleeve. The readings I took were significantly lower; the Dynamite gauge read 55psi and the Hobbico, 30psi. If you remember, my new CZZ gave me a reading of 35psi with the Hobbico gauge and 70psi with the Dynamite. Such a large difference indicates the need for replacement parts; adjusting the shims just won't cut it.

The gauges mentioned in this article do not provide suggested psi val-



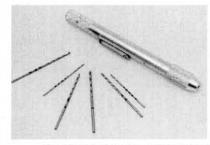
The Dynamite model engine compression gauge measures compression from 0 to 160psi. It's light and compact, so it won't take up too much space in your toolbox. Check out the protective rubber case.

ues for different engines because too many variables can affect compression, e.g, because of different weather conditions, a reading made on the West Coast may not be the same as one made on the East Coast. With a base-line reading, you'll be able to adjust your engine when stomach-churning factors arise. If your engine runs great at one track and not too well at another, take a reading at the "good" track. Then go to the other track and adjust the head shims until the compression readings are the same. Humidity and barometric pressure may be the bad tomatoes in your burrito.

See? All you have to do is pick up a compression gauge, screw it on your engine, turn it over and voilà!—a possible cure! Or maybe not; you might get those stomach pains again when you realize that adding or subtracting shims won't solve your problems and that it's time to install a new piston and sleeve. Both the Dynamite and Hobbico gauges have a slot in my pit box.

-Greg Vogel

TRINITY Valve O'Matic Piston Tuning Tool



EALLY SERIOUS, experienced off-road and sedan racers tune their s u s p e n s i o n setups with shock fluid and spring changes to suit the particular terrain or track that they have to conquer. Sometimes, all it takes is a fluid

change to cope with a slippery or bumpy surface; a different spring may allow their buggy or truck to clear the track's killer triple jump. Occasionally, they'll need to change the shock pistons. During faster suspension operation, a piston with more holes or larger holes will allow greater fluid flow during the shock absorber's compression and extension strokes; one with fewer or smaller holes will restrict that flow. At some point,

racers may need a type of shock piston that isn't in the pit box—maybe one that isn't even manufactured. That's when Trinity's* Valve-O-Matic Pin Vise (part no. 7914, \$19.99) comes in handy.

A pin vise is a miniature hand drill popular with machinists and precision modelers. Trinity has combined, in one package, a bit holder and six small drill bits in the sizes that are most often used in shock-piston (or valve) tuning (nos. 55 through 60). The bits are stored in the handle, so on race day, you can just toss the whole shebang into your pit bag.

The 'Matic easily and precisely enlarges holes to the next larger size. If you have to add a new hole, it's best to start it with the tip of a hobby knife. Small drill bits are easily bent or broken, especially when they are used on the tough nylon, $Teflon^{TM}$ and plastic that shock pistons are made of. This is a great tool, and it gets the R/C Doctor's seal of approval!

-Doug Mertes



NOVAK'S R/C Analyzer

R/C DIAGNOSTIC EQUIPMENT

they needed a diagnostic tool that would allow their authorized overseas repair technicians to properly analyze and repair the company's electronic products. This tool had to provide a full range of calibration readings

and be easy to transport. Their solution was the purple-anodized R/C Analyzer—released last year—it is now available to the public.

Three input leads allow the user to connect this analyzer to a servo, an ESC, or a receiver and to check various performance and setup criteria like BEC voltage, full throttle

and brake settings without having to remove the equipment from the car or truck chassis. An LCD readout confirms ESC setup in frame size by milliseconds, then reconfirms proper setup while operating the receiver and ESC through the transmitter. This not only pinpoints transmitter problems like neutral wandering (pretty typical on transmitters as they age, according to Novak), but it also permits the user to save these readings and set up multiple ESCs to match a particular racer's radio and preferences. Hook up a servo, and you'll be able to tell whether it's centering properly or pulling so much current that it's causing interference problems. (This

can happen with high-torque FET-driven servos that get a lot of use.) The load motors attached to the side of the case even let you confirm how much amperage the ESC will pass while under various load conditions.

Although this unit is not for the average or casual hobbyist, it would be invaluable for a busy retail store or diagnostic service that gets a lot of electronic equipment questions. If I had to diagnose a half-dozen or more sick radio systems a week, I'd find it hard to do without one of Novak's R/C Analyzers.

—Doug Mertes





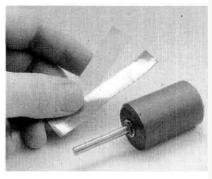
Novak's Tyree Phillips demonstrates the R/C Analyzer.

плиту Off-Road Tire Balancer

SET YOUR TIRES

F YOUR off-road tires—especially truck tires—tend to bounce up and down or give you traction and steering problems, Trinity's* new no. 6063 Off-Road Rear Tire Balancer may be just the tool you need to get things smoothed out. This innovative assembly of steel and purple-anodized aluminum eliminates the need for complex, difficult-to-operate balancing devices: it's simple, it's well-made, and it works!

Simply place the complete (and glued) wheel/tire assembly on the bearing-supported shaft, and spin the wheel. When it stops, the heaviest section of an unbalanced tire will be on the bottom. Place a small piece of the included adhesive-backed lead tape on the



inside of the rim on the light side (that's the top), replace the wheel and tire on the shaft, and spin again. Repeat this step several times and mark the side that falls until the wheel no longer always stops with the same part at the bottom. (Sometimes it only takes a single piece of tape.) Complete instructions on the process are included.

If your truck or buggy uses front axles with a \$^1/6\$-inch inside diameter, you can also use this tool to balance front tires. Many oval cars (like my Custom Works Intimidator and C&M Team Cobra Nemesis) use this axle size, so it's easy to balance all of their tires as well. By replacing the supplied bearings with the \$^1/4x^3/8\$-inch bearings found in the rear pod of your pan car, you could also balance tires from the rear of your $^1/10^2$ - or $^1/12$ -scale road burner.

Given its ease of use and portability (it's only a few inches long), I expect to see Trinity's balancing act show up at pit tables across the country this year!

—Doug Mertes

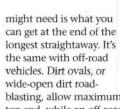
*Addresses are listed alphabetically in the Index of Manufacturers on page 201.



by David Ditner

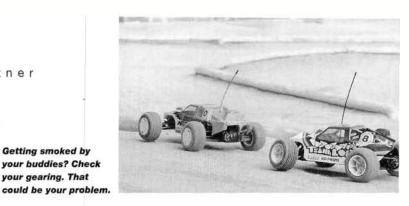
Don't Gripe, **Gear it Right**

T MOST TRACKS, there are one or two people whose cars always seem to run faster than anyone else's. You may have tried to keep up by buying the same motor and battery pack, but they're still feeding you



Getting smoked by

your gearing. That



blasting, allow maximum top end, while an off-road track with lots of hills, jumps and turns requires faster acceleration more than top speed.

How do you change gearing? The quickest way is to change the relative sizes of the pinion and/or spur. If you divide the spur's teeth number by the number of teeth on the pinion, you'll get a ratio. Numerically, this gear ratio tells you how many rotations the pinion turns for each rotation of the spur. Generally, swapping the pinion for a larger one results in more top end and less acceleration, while moving to a larger spur has the opposite effect. Likewise, "upsizing" the pinion has

what works and what

doesn't. Always view his

ing point. Your driving

suggestion as a good start-

style may be better suited

to quicker acceleration or

to higher top speed than

another person's. Look at

as reference points; it's up

these recommendations

to you to dial in your

vehicle.

sizing" the spur. To look at the difference in effect of changing your pinion and spur, look at the size and number of teeth on the gear you are changing. Because the pinion is smaller, going one tooth up or down on it has a much greater effect on performance than going one tooth up or down on a spur. Consider the following: a 15-tooth pinion and a 90-tooth spur. The overall ratio is 6:1. This ratio also holds for the effect of the gear change. A one-tooth change on the pinion will have six times as much effect as a one-tooth change on the

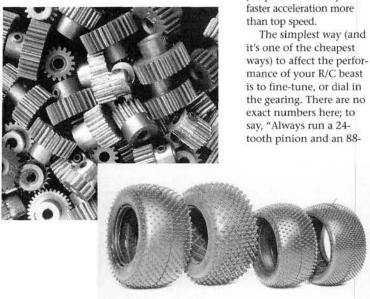
the same effect as "down-

spur gear. Here's how the numbers work: with the 90-tooth spur, a 14-tooth pinion gives a ratio of 6.43, while a 16-tooth pinion gives a ratio of 5.63. Those are fairly significant changes.

Let's look at changing the spur gear. Going back to our original gear set, the 15-tooth pinion and 90-tooth spur and its 6:1 ratio, increasing the spur to 91 teeth increases the ratio just to 6.07:1. Dropping the spur to 89 teeth decreases the ratio to 5.93:1. In our example, we changed only the tooth count on each gear by one. It's easy to see which one had the greatest effect.

Want a rule of thumb? Scope this: the smaller the gear, the greater the effect of making a one-tooth change. A more precise rule to determine the effect of a change is to divide 100 by the number of teeth on the gear you're thinking about changing, and look at that number. It's the percentage change you'll get (up or down) when you increase or decrease its tooth count by one. Going back to our example with the 15-tooth pinion, we see 100:15 is about 61/2 and 100:90 is about 1. Remember, these are percentages, and they must be multiplied by the old ratio to get the new

You're probably asking, "Why bother?" The truth is, you should consider all the facts before you make a pinion or spur investment. Maybe you want stump-pulling, low-end power or wheel-standing



Not all tires are created equal. Tires come in different diameters. If you notice that your car or truck has lost some of its top end after you changed tires, you probably just installed a tire with a smaller diameter. If you want your truck to run exactly as before, break out a piece of string and do a little math.

taillights. What's their secret? Nine times out of 10, it's proper gearing.

Although many R/C cars come with a motor gear (pinion) and a tranny input gear (spur), they may not have the optimum gear ratio for how you run your vehicle. A large, open parking lot with wide turns allows awesome top speed, and you really don't need evil acceleration. On a tight, indoor carpet track, acceleration is key, and the only top end (speed) you

tooth spur on a Double-XT 'CR' with a stock motor" would be to oversimplify. More information is needed. Where will you run it? Which tires do you use? Which stock motor is it? What's your driving style? There are too many variables to generalize gear size and vehicle types. If someone at the track tells you which pinion and spur to run with your particular motor, this person probably has a good idea of

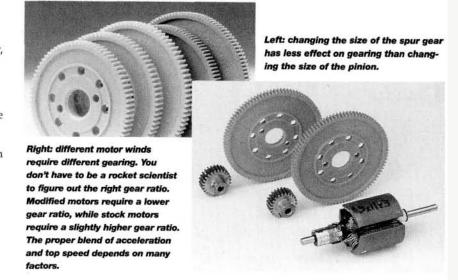
GETTING STARTED

acceleration out of a corner. Maybe you want silly, outta-hand top end. Just remember something before you change your gearing; there's no free lunch! When you increase one thing, you decrease the other. You can't improve both acceleration and top end at the same time with a gear change (unless you're way, way off in the first place). You improve top end at the expense of acceleration, or vice versa. To max out the all-around performance of your vehicle, you should be shooting for balance. Above and beyond everything else, your gearing should match your driving style and the surface's requirements.

DIFFERENT MOTORS NEED DIFFERENT GEARING

Maybe you just bought a modified motor. You tossed your stock 27-turn slug and picked up an evil 9-turn unit, and it won't pull a wet gumdrop out of a sick baby's mouth. How come? Something called torque! That 9-turn speedster revs like stink, but it has no grunt (torque), so

you've got to help



it with gearing. Drop the pinion size and watch it fly. You'll also increase run time!

TIRE SIZE AFFECTS GEARING

Maybe you slammed your bad off-road monster with low-profile street tires, and now it doesn't have any top end. Tires get into the act, too. Everything in the drive train-from the motor to the ground-has an effect. An easy way to grasp the differences between tires is to take a piece of string and wrap it once around a larger tire, marking it with a colored marker at one full circumference. Then do the same for a smaller tire with the same piece of string. Now, lay the string out straight and look at the distance between the marks. That distance reflects the change in effective gear-

ing that results from differences in tire diameters.

Now, knowing what you know about gearing, you can figure out what you have to do to get your car or truck sceamin' again. Because your tires are smaller, you'll want to use a larger pinion gear (more teeth) to compensate. How much? That's easy. Measure from the end of the string to each mark. Divide the longer length from the big tire by the short length from the small tire to get a number (this is the percentage difference in tire size). Take that number and multiply it by the number of teeth on the pinion, and you've got the number of teeth you need on the pinion gear.

Let's do one together. We'll put smaller, racing-truck tires on our Traxxas* Stampede monster truck. The circumference of the stock tires are about 15 inches around (circumference). The racing truck tires are 11 inches in circumference. 15÷11 = 1.36.

A typical off-road transmission has an internal reduction. This article does not factor in the effect that the tranny's internal reduction has on the overall final gear ratio. For the most part, calculating the pinion/spur ratio alone will simplify things considerably.

We'll use these numbers with the 15-tooth pinion and 90-tooth spur mentioned earlier. $1.36 \times 15 = 20.45$. So a 20- or 21-tooth pinion would work well and bring you really close to the performance you had with the big monster meats.

You can use this information to wreak havoc on your buddies at the parking lot or anywhere else. Gearing is the key to buttgrinding performance. Experiment with a variety of pinions. Whenever you put a different motor in your vehicle, you'll need to look at re-gearing. Change tire diameter? Change gearing. Off-road to on-road? Change gearing. Get my point? It never hurts to have a range of pinions and spurs. Gearing properly is an easy (and cheap!) way to kick some butt! Remember: anything goes in the name of speed, and speed equals joy! See ya!

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.



KYOSHO Mantis EP and GP

by Peter Vieira

OOK, I KNOW how you feel. You don't want to be a beginner. You don't want entry level. You want your first car to be a new Nitrol'ury Extreme 2BX with the 3-speed transmission and dual ball diffs. So what if you don't know what a "ball diff" is! You want it! But you know you'd just be lost if you got that unobtanium pro missile thing. Heck, the English, Is there anything that can satisfy your craving for automotive excitement that doesn't require the know-how of a seasoned R/C racer?

Well. Kyosho* has a car for you. ve of little R C knowledge. Actually, Kyosho has a whole series of 'em. The new Mantis series offers gas-powered (GP) and electric-powered (FP) vehicles that arrive virtually ready to run, with super scale bodies and plenty of upgrade potential. They're also very durable and relatively inexpensive, and it just so happens that you are looking at a full test of both an electric Mantis (a Shelby Cobra) and a gasser (Volvo 850 racing sedan in British Touring Car Championship trim). Interested vet?

KIT FEATURES

This is usually where I say that the parts are neatly bagged and labeled. In the case of these Mantis cars, only a few parts were in this state: the rest had already been built up into the assembled chassis! I found it a little unsettling when I opened the box and saw the chassis practically finished. (I'd feel the same way if I unwrapped a burger at McDonald's and a bite had been taken out of it already.) To finish the rolling chassis, you just install the servos and linkages, glue on the tires and mount the wheels.

Electric or gas; this pair preys on other entry-level touring cars

98



Mantis GP Volvo BTCC



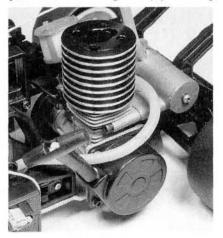
Manus EF Cobra



KYOSHO MANTIS EP AND GP

You even get to experience the joy of threading steering rods together (add sarcastic tone here). The instructions are crystal-clear on how to finish the kits, but no instructions are given for rebuilding. At least an exploded view of the car is provided so that you can identify parts and see where everything goes. Excluding painting, I spent a leisurely hour or so on each kit,

including looking-for-the-nut-I-dropped time, snack time, bathroom time, changing-the-CD time and answering-thephone time. Although I enjoy building

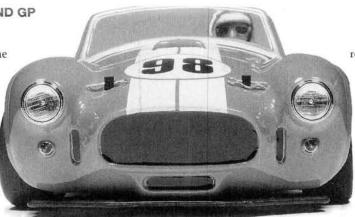


The Kyosho GX-12CR nitro engine provides plenty o' power for the Nitro Mantis. The included expansion chamber/muffler helps keep the neighborhood somewhat quiet.

new kits from the ground up, I'll admit it was nice to get a car together without committing myself to a 4-hour wrenching session.

FACTORY OPTIONS

- 5x10mm ball bearings—part no. 1901.
- 8x14mm ball bearings—1911.
- Universal drive shafts (must use with SP02 drive washer)—W5066.
- Adjustable rod set—SPW5.
- 5.8mm ball end (for use with SPW5)— 1295.
- 5.8mm pivot balls (for use with SPW5)—OT-32.
- Wide slick tires-92551.
- Mesh wheels—92555.
- Shock-mounting kit—MIW01.
- Oil-filled sport shocks (color)—W5141.
- K-Speed motor for electric Mantis (many winds available)—70553-70558.
- Clutch bell with 13 to 16 teeth for nitro Mantis—92613-92616.



Both Mantis cars were cleverly engineered for simplicity and versatility. Unlike typical R/C car designs that mount suspension and drive train subassemblies on what is basically a flat chassis plate, the Mantis vehicles use girder-like bulkheads sandwiched between chunky, triangulated trusses that form the sides of the chassis. The gas and electric cars share the same front end, suspension and transmission, as well as identical five-spoke wheels shod with sticky slicks for the rear and

harder smoothies for the front end. All four wheels are identical, spin on plastic bushings and are mounted on the axle with a hex socket. They're even interchangeable with Tamiya* and HPI* sedan wheels and others of the same hex pattern. Unlike buggy-conversion on-road cars, the Mantis transmission mounts the motor ahead of the spur gear for a true midengine layout. Just three gears make up the tranny's internals, and a bevel-gear differential sends power to the rear wheels via steel dogbones. The gears are arranged in a "laydown" configuration, which helps

to keep the center of gravity low. The whole deal spins smoothly thanks to factory-lubed metal bushings, and both cars have perfectly set gear meshes right out of the box. For materials, the electric Cobra uses all-plastic construction, while the nitro-powered Volvo uses an aluminum base plate in the rear to dissipate motor heat. In both cases, the plastic components appear to have a high fiber content, and the completed chassis are quite stiff.

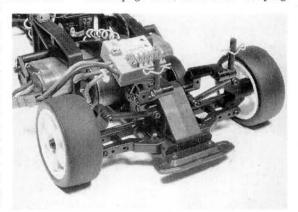
A stiff chassis needs supple suspension, and the Mantis cars deliver. Don't look for any conventional coil-over shocks here, however. The extra-beefy suspension arms appear to have inviso-shocks; the arms just jut out of the car, defying gravity and somehow keeping the chassis off the ground. The secret? Each suspension arm has its own spring that wraps around the hinge pin at the chassis end of the arm. It

resembles an overgrown motor

brush spring and works quite well. Kyosho even builds in the adjustability of coil-over shocks with a clever setscrew system; each arm has two setscrews threaded into it. One bottoms out on the chassis to control ride height. The other pushes on the spring to adjust its preload; this allows the perceived "stiffness" of the suspension to be adjusted.

More advanced drivers can use these screws to adjust the way the chassis' weight is distributed to each wheel; racers call this "tweak." Don't expect to make any camber adjustments, however; fixed links tie the hub carriers to the chassis. Toe-in is adjustable via threaded rods that directly connect the kit-supplied servo-saver to the steering knuckles.

The downside of the Mantis series suspension is damping, or lack thereof. As with a pogo stick, there is no damping.



Look, Ma; no shocks! Squint, and you can see the gleam of the inboard suspension springs. Squint really hard, and you'll see the ride height setscrew. Check out the beefy arms and the fixed-length camber links.

THINGS YOU'LL NEED

Volvo—Mantis electric power (EP)

- Paint for polycarbonate body.
- 6-cell battery pack.
- 2-channel surface frequency radio with two servos.
- **■** Battery charger.

Cobra-Mantis gas power (GP)

- Paint for polycarbonate body.
- Glow-plug heater.
- Glow fuel.
- Spare glow plugs.
- Fuel bottle.
- 4 AA batteries for receiver or prebuilt Ni-Cd receiver pack.

KYOSHO MANTIS EP AND GP

When you jump onto a pogo stick, you load its spring with energy, and thenboing!-the spring returns the energy, sending you into the air. Now imagine a pogo stick with one of those anti-slam cylinders from a screen door attached to it. Now when you load the spring with energy, the cylinder absorbs much of the energy that the spring releases on its return stroke, and this prevents you from launching into the air. That's damping in action (and one boring pogo stick). Damping a vehicle's suspension action increases control and the vehicle's ability to hold the road by preventing it from bouncing endlessly after every bump. You can see this with a properly set up offroad R/C car; when dropped on the track, it will land like a wet towel. Plop, the shocks soak up the hit-no bounce, no boing. The Mantis cars, when dropped from an inch off the ground, do a little

clutch shoes. It's a pretty neat design, and it allows the plastic spur gear to mate with a plastic pinion, as opposed to a metal one. This should allow both gears to last longer. The clutch bell is supported by two metal bushings, and this gave me some trouble. After a few runs, the bushings permitted just enough play to allow the clutch bell to vibrate on the crankshaft at idle instead of letting the shaft spin smoothly on the bushings. This caused the crankshaft to engage the clutch bell and stall the car or make it dart away, depending on the idle speed. I replaced the bushings with bearings, and the problem was solved. After pulling the



Kyosho's Cobra body has all sorts of injection-molded parts; check out the roll bar, side pipes and retro-look driver.

dance as the springs absorb and rebound, absorb and rebound. We'll see how this plays out on the track later.

Let's talk power. The Volvo's Kyosho GX-12CR nitro engine is the star here, and it features a tall, anodized, heat sink head, rotary carb, pull-starter, foam air filter and two-shoe clutch. The clutch bell looks cheap at first glance; it's plastic! A peek inside, however, reveals a thick, molded-in metal band that engages the engine apart to solve the clutch mystery, I can attest to high-quality ball bearings, a beefy, machined connecting rod and firstclass construction. It's a terrific engine, but it does have a startling omission: no mounting tabs. Instead, three screws pass through the chassis and are threaded directly into the aluminum crankcase. This works fine, but there's trouble ahead if one of those holes is stripped out. To avoid the agony of having stripped

Building & Setup Tips

- · Use the tip of a hobby knife to chamfer the openings of the holes in the steering knuckles and servo-saver before you thread in the pivot balls; this will make starting the thread much easier.
- A tiny bit of kit lube or soap on the threads of the linkages will make threading the rod ends easier. (I'm stuck on these threading tips because there isn't much else to do on the cars!)
- On step 10, the manual for the nitro Mantis requires that you feed the throttle linkage into the motor's throttle lever, which, unfortunately, is undersize. A hobby knife can easily be used to enlarge the hole, but I had to remove the motor to gain enough fatfinger room to do the job. If you can do this
- while the motor is in the car, get yourself to medical school right away.
- Remove and reinstall the motor mounting screws with a little medium thread-locking compound. You don't want to learn the rest of the "ounce of prevention" equation by experience, do you?
- · Before you head out to the track, make sure that you have an 8mm socket wrench of some type to pull the glow plug out in case you flood the motor. Make sure that your tool will fit down the narrow opening in the heat sink head. It's a tight squeeze!
- Heed my sage advice and tape in your receiver crystal when you set up the nitro Mantis!



- 90-percent assembled.
- Accepts all sorts of aftermarket bodies and wheels.
- High-quality parts.
- Lots of upgrade potential.
- Nitro car is fast!

Dislikes

- Electric car is not as fast.
- Both cars exhibit lots of "push."
- Manuals don't address disassembly or rebuilding.
- Nitro car's clutch bell needs bearings.
- Hey, Kyosho, how about throwing in one of those cheap but effective glow plug wrenches, as you used to with the Rampage series kits?

threads, instead of overtightening the screws, rely on thread-locking compound to keep them secure, and never use a power screwdriver. Also missing from the GX-12 is a low-end mixture needle Pundits will say this limits tuning flexibility; I say it's one less thing to worry about! A glow plug is included, but spares aren't. You'll also need a Hot Shot or a similar device to heat the glow plug to run the car.

For the electric Cobra, Kyosho supplies their LeMans closed-endbell stock motor and rotary 3-speed mechanical speed control. Installing these parts made me all misty-eyed; my first car, an Ultima II, used them as well. They're old Kyosho standbys, reliable and simple, but pretty dull, especially compared to the gas powerplant of the GP car. For the beginner, however, it's a good, inexpensive setup and is easy to maintain. Just keep the speed control's contacts clean, and you should have no problems.

Both kits require that the speed control/throttle/brake linkages be set up by the builder; this is often a real pain in the neck to get right, especially with the relatively limited adjustment options of most entry-level radio systems. I'm happy to report that as long as you follow the instructions, the linkages are a no-brainer. I had no problem pulling all three speeds and reverse out of the mechanical speed control, and the gas car's throttle/brake setup was spot-on. For fine-tuning, the gas motor's linkage uses knurled knobs on the threaded control rods-no fussing with pesky collars and setscrews.

To cap all this stuff off, Kyosho supplies high-quality polycarbonate bodies with masking film, molded detail pieces and decal sheets. Window masks would be a nice inclusion with an entry level kit, but the window lines are crisp, so masking isn't difficult. The Volvo 850 requires that

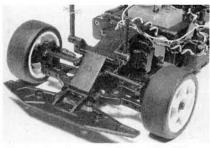


I went for my own paint scheme with the Volvo 850. If you're patient with the masking tape, by all means, go for a scale reproduction of the BTCC racer's stripes; Kyosho's decal set will let you get every detail just right.

you paint its stripes instead of using a big wrinkle-prone decal. Don't be afraid to give the Volvo a single-color paint job if the multi-stripe paint scheme scares you. This hobby is about having fun, not tearing your hair out. The Shelby Cobra body is especially nice: Kyosho pirated it from their "Nostalgic" series, and it's a real standout with its chrome details and driver figure, although he has an awfully weak chin for a guy driving such a hairy-chested car.

TEST GEAR

In keeping with the entry-level spirit, I installed Futaba* 2PB radios in each car with R112JE receivers and S3003 servos. As mentioned earlier, I had no trouble setting up the cars even without the endpoint adjustments that I would typically use to get linkage throws just right. For go-power, I used Trinity* Street-Spec stick packs in the electric Cobra, while the nitro Volvo was filled with Dynamite's* Blue Thunder 20 percent racing fuel. A Hobbico* Hot Shot provided the juice to fire up the glow plug.



The front and rear end views of the Nitro Mantis.



PERFORMANCE

With cars and radios piled in my back seat, I headed off to a local parking lot for some testing. I left behind the war chest of tools that I usually carry and brought along only a few basic beginner-style support tools: pliers, flat-blade and Phillips screwdrivers, Kyosho's included box wrench and Allen keys and an 8mm socket for glow plug removal.

The electric Shelby Cobra hit the pavement first. I eased it away slowly, pulling the speed control through its three steps to full throttle. Out of the box, the Cobra isn't very quick. It did, however, run for a solid 16 minutes at full throttle. Judging by how quickly the motor spooled up and the long run time, the Cobra is well undergeared. A quick check of the options chart revealed that the supplied 25-tooth pinion is the largest Kyosho offers, but the kit's spur gear is of the standard 48pitch variety, so any brand 48-pitch pinion off the wall of your local hobby shop will work. The motor plate is slotted for pinion adjustment, and there's plenty of room left to gear up two or three teeth. As for handling, the car had a whole lotta "push." Even with the steering wheel cranked over, the Mantis turned wide at speed as the hard front tires skated along the pavement. A quick pit stop for a front-to-back tire swap solved the problem, but now the super-soft gumballs up front coupled with the slippery hard slicks in the rear made the car drive as though it were on ice; anything less than slow throttle application and barely-there steering inputs made the car spin. I went back to the original setup and let the car push-much less frustrating.

I fired up the gas Volvo 850 next. It burbled to life with a few tugs of the pull-starter and idled perfectly—pretty impressive! Kyosho had the foresight to mold a finger hoop into the chassis, so you can pick the car up and blip the throttle without burning your hand on hot parts of the car. Although the GX-12CR uses an expansion muffler in lieu of a tuned pipe, the engine was fairly loud for a .12 size powerplant—not obnoxious, mind you,

SCALE

CHASSI	5
Type	Molded space frame
Material	Fiber-reinforced plastic

TIRE	S
Front	Kyosho slicks, hard
Rear	Kyosho slicks, soft

POWERPLANT

Motor (Shelby Cobra)......LeMans 05 stock Engine (Volvo 850).....Kyosho GX12 CR Pipe (Volvo 850).....Expansion muffler Battery.....Not included Speed control (Shelby Cobra).....3-step mechanical

but satisfyingly powerful-sounding. It felt powerful, too. In addition to the oomph, I was impressed with how little fuel was thrown by the crankshaft where it exits the crankcase. This is usually spooge city on engines without a sealed bearing in the front of the case.

As you might expect, the nitro car was much faster than its electric sibling. As the engine broke in and I leaned out the carb, it only got faster. This car can tear it up! Just don't ask it to turn at speed. It pushes just as poorly as the electric. In the wide-open spaces this car will typically see, it isn't really a problem, and push is a much more forgivable handling sin than a tendency to loop at the slightest provocation. As for the undamped suspension, both the electric and nitro cars seemed to suffer only on relatively big hits from large cracks in the pavement. These caused the cars to get out of shape as the suspension rebounded, but they never completely lost it. The heavy push

(Continued on page 163)



MRC Ironman Truck by Derek Buono

EMEMBER THE old days of Mickey Thompson? "Iron Man" Ivan Stewart? Well, MRC* has applied this legendary title to their latest off-road monster truck, and if you're among the tall-tire set, you should take a serious look at this new ride. It will take you back to the days when you first got started in (or addicted to) R/C vehicles. With its proven toughness and advanced design, the MRC Ironman punishes the wilderness and not the wallet.

KIT FEATURES

At first look, the chassis and suspension seem very familiar, and for good reason. The folks at MRC have taken their highly competent MT-10M and toned it down—ever so slightly—to make it more affordable for those who are on

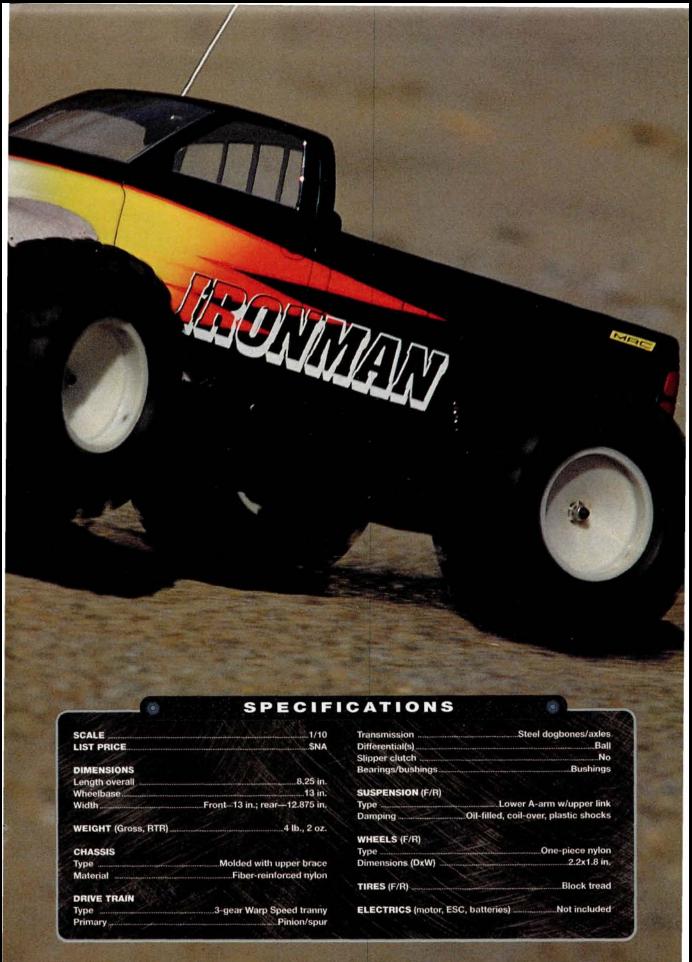
more affordable for those who are on a tight budget but would like to get started in R/C with a high-quality vehicle. The chassis is made of a composite material and has molded compartments for the battery and the other electronics.

At first, I thought the chassis was a little floppy at the front and

As you can see, the Ironman lives up to its name. This truck looks tougher than nails. All kits include a motor and mechanical speed control. MRC also sells a ready-to-run version that's assembled and includes a Futaba radio system.

80 RADIO CONTROL CAR ACTION





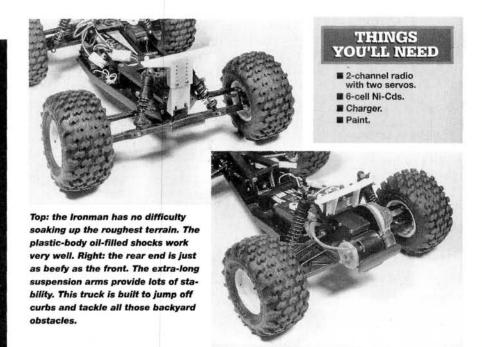
Building

I received a prototype, so there were no instructions, but the Ironman is basically like its big brother the MT-10M, so I followed the 10M's instruction manual and didn't have any problems. That I've assembled quite a few kits also helped. I have to admit, though, that I cringed at the thought of assembling the tie rods-my least favorite part of any assembly. (I'm in therapy to see whether some longsuppressed childhood trauma made me this way!) Anyhoo, the geniuses at MRC included fixed-length tie rods for the front and rear camber links, but the toe-in is fully adjustable. Woowhoo!

- · The transmission seemed a little tight at first, but when I ran the truck, it seemed to smooth right out.
- · When assembling the thrust washer in the ball differential, be careful not to lose any of the tiny balls; if they fall, say good-bye to them. Here is a simple trick to make your life a little easier. Curl your hand like a cup and pour the balls into a crack in your hand. Install the greased thrust washer on the diff nut, then pick up the small balls with the greased washer—saves time and
- If you need help with a particular step, consult your local hobby shop or place of purchase. If you're dazed and confused, they should be able to help.



The Ironman uses the Warp Speed tranny that's found on the MT-10Mno slipper clutch, but a ball diff is standard issue. A pinion and two spur gears come with the kit, but the final gear ratio can be altered quite easily thanks to its adjustable aluminum motor mount.



rear, but after I had mounted the gearbox and front brace, the chassis perked right up. The four, extra-long A-arms are damped by four, plastic-body, oil-filled shock absorbers. To add versatility, the kit includes two sets of shock pistons, so you can experiment with different damping settings.

Likes

Dislikes

■ Should have left the slipper!

The kit includes threaded steering rods that allow front-wheel toe adjustment, but the upper camber links are fixed, so camber can't be adjusted. I think this is actually a benefit because it's just one less way for first-timers to unwittingly "un-

dial" their trucks. And when their skills have improved, they can replace the fixed camber links with adjustable tie rods.

The larger-diameter monster-truck tires are some of the coolest kicks this side of the Rockies. They give this ride extra ground clearance, and when you're ripping through the woods, that's just what you need.

The transmission is basically the same

as the unit that's used on the MT-10M, but the slipper clutch has been omitted to keep the price as low as possible. But I was glad to find that MRC has retained the ball diff, which could easily have been replaced with a gear diff. In addition, there are plastic bushings through-

out, but you could upgrade to bearings when your budget

mounts, cleanly incorporated in the design, provide the extra height that's needed to mount the included body. A mechanical 3-step

speed control and a standard 540-style motor are also included.

My trusty Futaba* Magnum Jr. radio is like the old family car that runs forever, so I installed it. Sanyo* 1500mAh sport packs provide the electrons for the motor, while Futaba standard S148 servos provide the steering and the throttle. To

the Competition	Traxxas Stampede	Kyosho HiRider Vette	MRC Ironman
Wheelbase	11 in.	11 in.	13 in.
Width (F/R)	10.25/ 11 in.	11.25 /11.5 in.	13/12.875 in.
Weight	4 lb., 8 oz.	4 lb., 14 oz.	4 lb., 2 oz.
Diff type	Gear	Gear	Ball diff
Chassis	Molded tub	Molded tub	Molded with upper brace
List price	\$180	\$169.99	NA
Available at*	\$100	\$99.99	\$100; \$175 RTR
Reviewed in	3/95	3/96	5/97

TEST	CE	AD	,



MRC IRONMAN TRUCK

ensure that I'd have the longest possible run time, I used Tekin's* versatile BC 112C peak charger.

PERFORMANCE

To be honest, when it was time to run this baby, I was as excited as a 10-year-old at Christmas. I've been so wrapped up in the competitive aspect of the hobby that I had forgotten what it felt like to just charge up a couple of packs and let it all hang out. I charged up as many

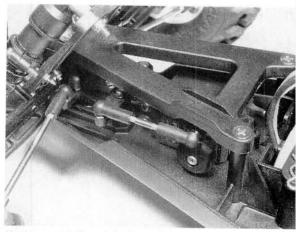
packs as I could scrounge and headed to the woods. There was no need to travel the coast in search of an indoor facility; it was me, the truck and nature.

I set up the truck with the included 4-hole pistons and some 50WT oil (the kit's stock oil was just too soft for a monster truck). I knew the extra-long arms would be more than capable of tackling the roughest terrain, so I looked for the roughest, least tamed environment I could find—smiling constantly. "Why?" you ask? Well, I was having fun, that's why. The truck took to the frozen

FACTORY

OPTIONS

Connecticut tundra like Happy Gilmore to golf. The large monster



The Ironman's chassis is strengthened by this molded upper brace. The bellcrank is similar to those of most racing trucks—smooth and rugged.

tires provide more adhesion than Polygrip. You could eat apples and drink hot coffee all day and the tires would stil stick to the dirt. It took me quite a while to get used to reverse, but the truck neve once whimpered or showed signs of failure—even after countless forward-to-reverse James Bond-style maneuvers. The included 540 motor, although adequate, left me wishing for a hotter stock motor.

MRC has done a great job of engineering this machine. Even when subjected to freezing conditions, the shocks provide exceptionally smooth damping. I used up my five charged packs and went

back for another round.
Before I knew it, I had spent
over an hour and a half outside, and this just proves that
this truck is built exceptionally well. Even in conditions
that were far from ideal, it
never gave me trouble, but
performed well, despite the

punishment that I subjected it to. This truck has to be one of the best dollar-to-performance values.



Not just an entry-level truck, the Iron Man is serious enough to be hopped up to beat the pants off your best friend's car and will still take a trip around the backyard. I have been active in the hobby for around 10 years, and this MRC truck rekindles the fire that has been in me since I first drove an R/C car. This Ironman edition is simply one of the most fun vehicles in my stable. Whether you're just starting or you've forgotten what it feels like to *really* enjoy this hobby, this truck's for you!

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.



Nice meats! These tires seem to stick to everything—even snowy tundra. I wouldn't recommend running this truck in the snow, though—unless you're as crazy as I am.



ASSOCIATED

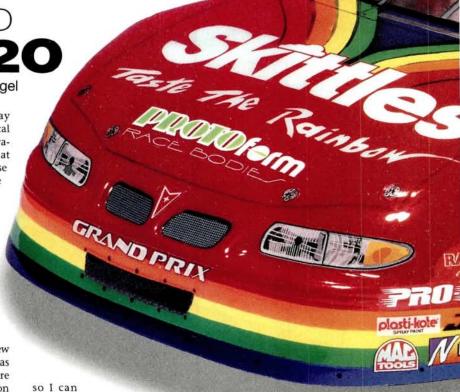
RC10L20

by Greg Vogel

■VEN THOUGH R/C superspeedway racing has seen many new technical advancements, Associated's* venerable 10LSS still continues to win races at all levels of competition. Why? Because it's a good, solid design that's as durable as it is easy to tune. These values were of paramount importance when Associated finally decided it was time to re-vamp its aging chassis. As a result, the new RC10L2O is as sophisticated in its design as any superspeedway chassis, yet it retains the straightforwardness that had endeared its predecessor to legions of loyal oval racers.

KIT FEATURES

After scoping out the pictures of the new RC10L2O, you may be asking, "What was Associated thinking?" It's the '90s; there are supposed to be a bunch of shocks on the back of the car, with tie rods zigzagging around and pivot balls swiveling all over the place. I don't know about you, but I just want to put the car together, slap it down on the track and have it work



win races.
Apparently, Associated
had the same idea. If you look
closely at the rear end, you'll notice
that the motor pod has been totally

re-designed to be more user-friendly.

For starters, the new T-plate has several characteristics that improve the suspension geometry. Its "T" design allows you to center the motor's weight in the chassis. Now for the really cool part. If you wanted to change the stiffness of the T-plate on the older 10LSS, you had to buy optional T-plates in various thicknesses. Then you had to take the car apart

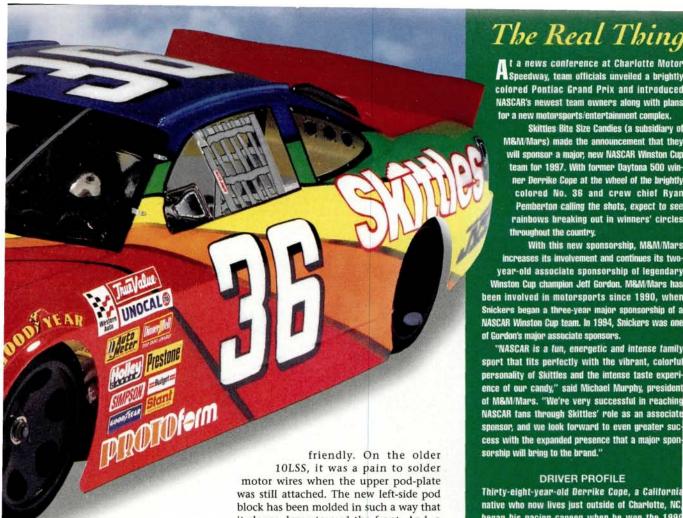
Sophisticated oval racer with a simple design

1/10	SCALE
\$260	LIST PRICE
	DIMENSIONS
14.25 in.	Length overall
10.5 in.	Wheelbase
7.75/8 in.	Width (F/R)
2 lb., 13 oz.	WEIGHT (gross, RTR)
	CHASSIS
Pan	Туре
Graphite	Material

Туре	Direct drive
Primary	Pinion/spur
Transmission	Rigid axle
Differential(s)	Ball
Slipper clutch	No
Bearings/bushings	

SUSPENSION (F/R)
TypeAssociated Dynamic Strut/
T-bar w/pivot balls
DampingCoil spring/single, coil-over, oil-filled shock; damper plates
oil-filled shock; damper plates

WHEELS (F/R)	
Type	One-piece plastic
Dimensions (DxW)	
—front	1.75x1 in.
-rear	1.75x1.625 in.
TIRES (F/R)	Associated Green
	compound
ELECTRICS	
Motor, battery, ESC	Not included



The new RC10L20 is

sophisticated in its

design, yet it retains the

straightforwardness

that had endeared its

predecessor to legions

of loyal oval racers.

to replace the T-plate. This is no longer the case. Just thread in a screw, washer and a nut to the center hole of the T-plate and you increase its stiffness. Here's how it works: the rear of the Tplate has three screw holes. At least two

screws are needed to secure the T-plate to the motor pod. When the third, center, screw is left out, there is more front-to-back flexing between the two screws and the pivot ball, so the rear of the car feels soft, but this has little effect on the side-toside stiffness of the Tplate. When the third

screw is added to the plate, flexing is reduced, and this makes it feel ... yup, you guessed it-stiffer! The third screw would normally be used on smooth, hightraction surfaces. Above the T-plate you'll find a narrow piece of graphite that acts as a brace to reduce chassis flexing between the two pivot-ball points.

Here's another example of how Associated made the RC10L2O more userit slopes down toward the front. And, a section of the graphite upper plate toward the left front has been cut out. As a result of these changes, soldering motor wires is now much easier.

The damper post has been relocated to the new T-plate cross-stiffener instead of being mounted on the T-plate pivot point as on the previous model. This takes a lot

of stress off the screw that goes through the pivot ball. damper disks remain unchanged, as they are simple to adjust and provide effective damping.

The chassis has also been improved to better suit oval racing. The battery slots have been

elongated toward the car's left side to allow you to alter the position of the battery pack. The pack can be placed anywhere within the slots to alter the car's chassis roll-rate and performance. The battery can be moved far to

A t a news conference at Charlotte Motor Speedway, team officials unveiled a brightly colored Pontiac Grand Prix and introduced NASCAR's newest team owners along with plans for a new motorsports/entertainment complex.

Skittles Bite Size Candies (a subsidiary of M&M/Mars) made the announcement that they will sponsor a major, new NASCAR Winston Cup team for 1997. With former Daytona 500 winner Derrike Cope at the wheel of the brightly colored No. 36 and crew chief Ryan Pemberton calling the shots, expect to see rainbows breaking out in winners' circles throughout the country.

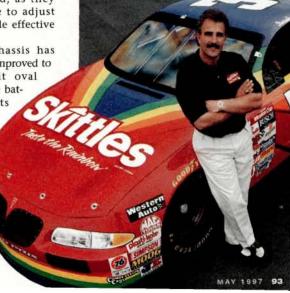
With this new sponsorship, M&M/Mars increases its involvement and continues its twoyear-old associate sponsorship of legendary Winston Cup champion Jeff Gordon. M&M/Mars has been involved in motorsports since 1990, when Snickers began a three-year major sponsorship of a NASCAR Winston Cup team, In 1994, Snickers was one of Gordon's major associate sponsors.

"NASCAR is a fun, energetic and intense family sport that fits perfectly with the vibrant, colorful personality of Skittles and the intense taste experi ence of our candy," said Michael Murphy, president of M&M/Mars. "We're very successful in reaching NASCAR fans through Skittles' role as an associate sponsor, and we look forward to even greater success with the expanded presence that a major sponsorship will bring to the brand."

DRIVER PROFILE

Thirty-eight-year-old Derrike Cope, a California native who now lives just outside of Charlotte, NC, began his racing career when he won the 1990 Daytona 500 in his 71st start in Winston Cup competi tion. Since then, Cope has become one of the mos popular drivers on the circuit. The son of professiona drag racer, he turned to motorsports after a knee injury ended his prospects of a professional baseba career. Since he started to race full-time in 1988 Cope has won more than \$3 million.

We look forward to hearing more about this excit ing new motorsports venture, but in the meantime contributing author Greg Vogel will carry on the tra dition in 1/10 scale, thanks to the efforts of maste painter Brian Chudy.



ASSOCIATED RC10L20

the left to keep most of the weight on the inside and compensate for the force being exerted on the car when it's cornering. You could also leave the battery as close to the center as possible to give the car more right-side bite for better steering.

One of the seven wonders of the R/C world is found on the front end of this car: Associated's Dynamic Strut front end. This suspension setup is so popular that many other companies have adapted it to work on their cars. You won't find many changes on the front suspension



Likes

- Great instructions.
- Easy to build, tune and maintain.
- Smooth handling.
- Excellent chassis layout.
- Durable.



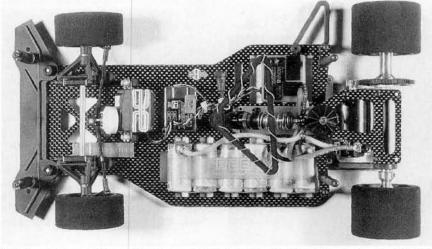
Dislikes

■ Front axles aren't threaded.

because, simply put—it works! The front end provides smooth damping, and it's fully adjustable. Associated did, however, add a new aluminum brace between the two suspension arms to limit the possibility of front-end bowing.

TEST GEAR

Even though the new 10L2O is race-ready right out of the box, I made a few changes to make it perform better on carpet-oval tracks. I ditched the 48-pitch spur gear and slapped on a 125-tooth, 64-pitch spur gear. My only other change was losing the stock tires and replacing them with Pro-Line/Jaco* tires (Blue compound up front and White in the rear). A Futaba* 132H servo is used for steering, while a Novak* Mercury receiver and 410-HPc speed control round out the rest of the electronics. Reedy* was nice enough to send me a killer Sanyo



This is what you call an all-business oval-racing chassis. At a glance, the chassis may appear to have undergone only subtle changes, but the truth is, the L20 is an all-new car.

THINGS YOU'LL NEED

■ 2-channel radio system with one

servo and ESC.

Body and paint.

■ Tools.

Battery and charger.

Motor and pinion gear.

2000mAh Zapper battery pack and an "S" Tri-Sonic motor.

To top off the car, I added a Proto-

form* '97 Grand Prix body that had been custom painted by Brian Chudy to match the Skittles Winston Cup car (see sidebar). The colors are exact duplicates of those on the real

car, and the brilliant graphics are actually hand-painted by Brian.

PERFORMANCE

After being off the oval-racing circuit for a little while, it was a little nerve-wracking as I put the car down on the track. For the first test, I went to one of my favorite racing facilities: R/C Madness in Enfield, CT. As I slowly rounded the flat, carpet oval to

set the steering and work off the tiretraction compound, the other cars shot by me like darts. With my breath held and my face turning blue, I hit the throttle and shot down the straightaway. I went into the first turn, blipped the throttle off and then right back on and then sped down the back straight. I completed a whole practice run without slapping the walls like a windshield wiper. Yeah!

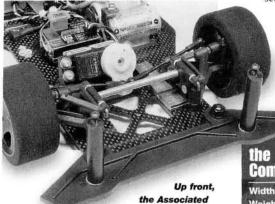
The car ran as smooth as silk. The rear

suspension soaks up every little bump and allows the car to accelerate smoothly and easily. For an out-of-the-

FACTORY H

- Chevy Lumina oval body—part no. 6179.
- Ford T-bird oval body—6120.
- Jaguar XJR16 narrow—6125.
- Wing, narrow—6182.
- Wing, wide—6183.
- Rear wheel/tire—8165.
- Front wheel/tire—8140.
- Rear wheel/chrome—8151.
- Front wheel/chrome—8126.
- Front suspension spring .018 in.— 8427, .020 in.—8429, .022 in.— 8431, .024 in.—8433.

box car, the smoothness of the handling was definitely impressive. In fact, I let a friend drive it, and he, too, was also amazed by the improvements and how they affected overall handling. During practice, I had Blue/Orange-compound tires on the outside, and they made the car push. I returned to the pits and



dvnamic-strut sus-

pension has been carried over. Check out the new aluminum brace between the left and right bulkheads. The author added some lead weights to the left-front side of the chassis.

the Competition	Wood Racing X-13	Bolink LTO Extreme	Trinity Switchblade 10SS	Associated RC10L20	HPI Road Star 10G0
Width (F/R)	7.5/7.75 in.	7.8 in.	7.25/7.75 in.	7.75/8 in.	7.5/7.74 in.
Weight	2 lb., 10 oz.	2 lb., 10 oz.	2 lb., 10 oz.	2 lb., 13 oz.	2 lb., 10 oz.
Diff type	Ball	Ball	Ball	Ball	Ball
Chassis	Graphite	Graphite	Graphite	Graphite	Graphite
List price	\$439.95	\$239.95	\$299.99	\$260	\$335.00
Available at	\$299.99	\$179.99	\$189.99		\$199.99
Reviewed in	1/97			5/97	

ASSOCIATED RC10L20

Building & Setup Tips

The tips provided with the kit make getting started in oval racing easy. Right out of the box, the car should handle well enough to get around the track smoothly. The car pushed a little, so I called Cliff Lett at Associated to see whether he could help cure this. He shared a simple on-road racing philosophy: 70 percent of the dialing has to do with traction. If the car is pushing or hooking, change the tires before you fool around with the suspension. The next 20 percent of setup has to do with the body: is it creating enough downforce, or do you need a wing? The final 10 percent of setup has to do with the suspension. I set up my 10L20 as follows, and it was hooked up big-time!

FRONT END

- . 02 springs (left and right)
- 0 degrees caster (upper-arm mount centered)
- 0 degrees toe-in
- 1 degree positive camber on the left front
- 1 degree negative camber on the right front
- · Optional in-line steering used
- 20WT oil in the shock with silver spring
- Third screw installed on the T-plate
- RCPS Green Slime on damper plate
- Battery mounted as far to the inside (left) as possible
- 125-tooth spur and 23-tooth pinion
- 1½ ounces of lead on the left front
- Protoform Grand Prix body
- Use a little drop of CA on the screw that holds the damper post, because it may loosen as a result of all the movement around it.
- Use different diff lubricants in the damper disks to change the action of the rear pod's side-to-side damping. Try Associated diff-ball lube or RCPS Green Slime to slow the action.
- To stiffen the springs, add shims between the springs and the screws.

About
the only
other thing
I changed
was the spur
gear. I like to use
64-pitch gears,
because they allow
more subtle gear
ratio changes.

mounted Blue-compounds up front, and this seemed to remove most of the push. I also added the third T-plate screw to reduce rear traction a little; I used RCPS* Green Slime on the damper plate, and I used Associated in-line steering blocks and axles to give the car slightly more aggressive steering. The car was definitely dialed and capable of winning.

Unfortunately, the gray matter in my brain decided to take a vacation during the main event, and I somehow forgot the fastest way around the track. If it hadn't been for my sudden memory loss, I might have won that day. The second track I chose to run the car on was a banked carpet oval at K&N Speedway in Stafford Springs, CT. With the same



The stock Green compound tires are excellent for asphalt, but my Jaco foamies worked better on the carpet. Jaco offers many tire compounds mounted on som of the slickest wheels around.

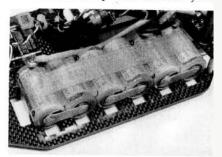
the pieces off the carpet with a pair o tweezers and a Ziploc® bag. When picked up the car, the only damage wa that a battery bar had broken off and the body had folded into the bumper.

Here's the all-new rear motor pod. This is the same unit that's installed on the world-championship winning RC12LC. Notice how the motor's soldering tabs are much more accessible. The pod also fea-

> tures a new adjustable T-bar that allows you to adjust the flex characteristics of the T-bar to suit different racing conditions.

FINAL THOUGHTS

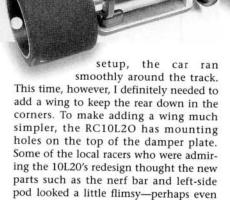
Once again, Associated has released a smashing success in R/C-car technology. The kit's new style of instructions make building user-friendly. The instructions are well-drawn; they explain every detail, provide helpful tips and include a setup sheet to record your



For more tuning options, the new chassis features elongated battery slots that allow racers to slide the batteries closer to the chassis centerline or further toward the outside of the chassis. The Reedy Zappers RC2000 cells are incredible. When combined with the Tri-Sonic modified motor, speeds in the neighborhood of 60mph are possible.

setups. For an out-of-the-box car, the RC10L2O is hard to beat. I think I'll have to put off-road racing on hold for a little while because I'm hooked on the speed and excitement of oval racing.

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.





The new Mercury shielded FM receiver provides the glitch-free signals and looks great mounted on the chassis.

breakable. Not by choice, I tested the parts as I plowed into a car at full throttle at the end of the straightaway. As the loud "smack" echoed through the building, I slowly put down my antenna and walked down the stand, ready to pick up



by Kevin Mever

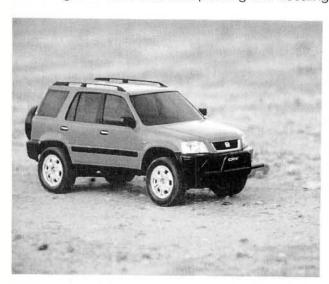
Tips and Tricks Toward Getting the Ultimate Finish

Paint and Detail Styrene Bodies

HE MOST OBVIOUS difference between painting polycarbonate (Lexan) and painting polystyrene (styrene or ABS) is that the former is painted on the inside and the latter is painted on the outside. Both have advantages and disadvantages when it comes to painting and decaling.



To detail the hood and door lines, I used a no. 000 sable paintbrush. Use any model paint, but avoid loading the brush with too much paint. Just dip the brush so that only the end has paint on it. If you paint outside the line, wipe off the excess immediately with a clean rag or paper towel.



I spent most of my formative years painting and building dozens of polystyrene ¹/24-scale models, so when I built my first R/C car, painting the inside of the body was a new concept to me. Now, I've painted more than my share of polycarbonate shells, and when I got the Tamiya Honda CR-V kit, I found it hard to revert back to my style of painting static models. I had to re-learn all the nuances of painting ABS bodies.

One of the positive aspects of the ABS molded bodies is the grea detail that can be achieved with this type of model. Also, when you pain one of these bodies, if you don't like the color, you can repaint it. It's eas ier to strip the paint off an ABS shell than a Lexan body gone bad! Here's how I get the best finish I can.

Sanding.

Before you mask or spray, go over the entire body with a piece of Scotch-Brite. This will roughen the surface just enough to help the pain bond. Any mold-form lines on the body can be wet-sanded with 400-. 600-, or 800-grit sandpaper; 400 is the most coarse. Starting with a coarse paper will make the work go faster but may require follow-up sanding with a finer grit (600 or 800) to remove sanding marks.

Now that you've finished painting your ABS body, it looks good, but you can make it look even better. Before you

That's One Fine Shine!

add the little details, such as the trim, the door handles, etc., you can get a mirror shine by using a polishing kit. A company called LMG Enterprises Inc.* sells a kit that will help you to achieve that award-winning finish. The kit includes some fine sanding paper, a rubber sanding block and polish to finish off the shine.

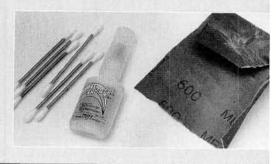
Let the paint dry for at least a week before you start to polish. Model paints take a long time to dry completely. The longer you let the paint dry, the better. The harder the paint, the better the fin-

ish. I like to start sanding with 4,000-grit sandpaper and work up to 12,000-grit sandpaper. It is good to use water

while sanding because it cleans and lubricates the surface. Be sure that you don't skip any grits, and always sand in the same direction. When you sand flat surfaces, use the sanding block. This will help you apply pressure more evenly.

For round surfaces, you may want to sand by hand.

Stay way from any raised surfaces or tight corners because the paint is thinner on these spots, and it will be easy to rub through it. While you sand, stop occasionally to see what kind of progress you are making. Sand only



2 Priming.

I don't like to use primer coats unless the model is molded in a dark color and I want to paint with a light color. Unnecessary coats of paint tend to build up and cover the body detail. Spray only as many coats as needed to get good coverage. Again, keep the body detail in mind when you strip and sand the paint. Excess sanding can diminish the fine detail work. When it is time to paint, mask with a good-quality masking tape and make sure all masking tape edges are pressed down firmly. Generally, it's a good idea, if possible, to spray light colors on first. Try to use paint made by the same manufacturer (don't mix brands). If you do use different brands, test the paints together on a scrap piece of plastic. Above all, use enamel or acrylic-based paints. Don't use paints designed for polycarbonate (Lexan).

More Painting Tips

- Before painting a styrene body, place the can of paint in a bowl of warm water.
 Warm paint will go on much smoother and will give you less orange peel.
- When you paint, spray on light mist coats until you have good coverage. Wait a least a half hour between coats. (If you apply just a couple of thick coats of paint, some areas will not be covered properly, especially sharp corners. The paint will be very thin here.) Finish up with a slightly heavy coat of paint. Don't worry about "orange peel," small runs, or any dust that may fall into your paint. They can be taken out with a polishing kit later (see "That's One Fine Shine!" sidebar).
- Another way to strip paint is to use Easy-Off oven cleaner. This does a great job of stripping paint and chrome off plastics parts. Oven cleaner is fairly toxic, so be sure to wear rubber gloves, and use it in a well-ventilated area.
- One way to get a smooth paint finish is to lightly wet-sand the surface using 3,200-grit sandpaper between coats. Wait at least a week between coats so that the paint can properly dry before

you sand.

• When you paint the trim detail or anything else with

a brush, use water-based paint. If you get paint where you don't want it, you can easily remove it with a wet cotton swab.

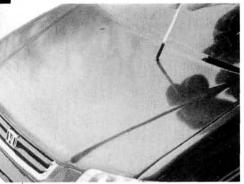
—Kevin Hetmanski



A silver permanent Sharpie® can be used to simulate the door locks. It makes a really nice, clean, round dot. I made personalized plates by using my computer and a couple of graphics programs. Oops; looks as if my plates have expired!

5 Runs in paint.

Runs can be wet-sanded (use 800-grit paper) and repainted. Light runs that don't affect the painted surface can be painted over without sanding. If any areas need to be stripped, isolate the section with masking tape and apply stripper with a brush. I like to use Easy-Lift-Off (ELO) manufactured by Floquil-Polly S Color Corp.* Follow the instructions and make sure that the surface is clean before you apply more paint. ELO is safe for use with polycarbonate shells also.



For the really small detailing jobs, I use a clean, flat toothpick. This works great for applying paint to the windshield washer nozzles.

BODY BEAUTIFUL

With a little luck, your final surface will be smooth and flawless enough to eliminate the need for a clearcoat finish. That's one less coat of paint to worry about. My painting philosophy is this: the more coats of paint you apply, the greater the chance that foreign material will land on the fresh paint.

This paint project really brought back a lot of memories of my static model days. Now the toughest part: I have to decide whether I should drive the vehicle or put it on the display shelf

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.

3 Painting distance from subject.

After the body has been cleaned and prepped, the trick to obtaining the best finish is the application. Be sure to follow the directions on the spray can. The amount of paint sprayed and the distance you hold the spray can from the surface are the keys. If you hold the can about 6 to 8 inches from the surface, you'll get a smoother finish. If you hold the can too far away, the paint will dry in the air before it gets to the body. This will result in a rough finish ("orange-peel texture").

There is a fine line between too much and too little paint. My finish turned out best

until you don't see any more shiny spots. You want the finish to be dull. The finish will get shinier as you go to the finer-grit sandpaper.

When you've finished sanding with the 12,000-grit sandpaper, you will be impressed with the finish. But that's nothing; just wait until you use the polish. You can use the kit-supplied polish or The Final Detail model wax from Treatment Products Ltd.* To apply the wax, use a very soft cloth. I like to slightly dampen the cloth before waxing. Also, use a dry, soft cloth to buff out the paint and remove the rest of the wax. Now you will have that mirror shine that you've always wanted.

-Kevin Hetmanski

when the paint was almost too heavy—to the point of starting to run. It's actually better to have too much paint; fixing small runs is easier than refinishing an area that has an orange-peel texture. Drying time information is important when you apply second and third coats. After that, allow 48 hours (2 days) before you sand or apply more paint. Allow plenty of drying/curing time before you mask over painted areas. I suggest a curing period of at least a week, depending on the number of coats you applied.

4 Painting area.

If you can paint in a clean, well-ventilated room, your chances of creating a high-quality finish will increase. Since I can't paint inside, I paint outside on a calm, clear day. After I've painted, I move the body inside to a low-traffic area of my house to avoid airborne dust.



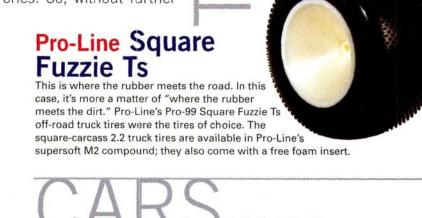
AST YEAR, when we decided to turn over our annual "Top 10" issue to our readers and let them tell us their ■ favorites, we had no idea what kind of response we would get. Well, it was better than what we could ever have anticipated; we spent weeks sorting through all the Readers' Choice ballots we received! Due to the overwhelming response, we decided to do it again this year. You'll notice that this year's choices are slightly different: we eliminated some categories and added a few new ones. So, without further delay, here are YOUR top choices!

your favorite cars • trucks • tires • chargers motors • drivers •

radios • speed controls

bodies • batteries

- 2. Pro-Line Speed Hawgs
- 3. Pro-Line Step-Pin
- 4. Pro-Line Road Hawgs
- 5. Pro-Line Dirt Hawgs
- 6. Team Losi IFMAR pin
- 7. Pro-Line Edge 2
- 8. Pro-Line Rally Hawgs
- 9. Pro-Line Flat Fuzzies
- 10. Pro-Line Sedan Speed Hawgs



Team Associated RC10B2

For the second year in a row, Team Associated's world-championship-winning RC10B2 was chosen as the top ride. It must have something to do with the

> car's trick, modular, molded-composite chassis, shock tower and suspension arms, its included Pro-Line tires, smooth, hardanodized Team Shocks, and raceproven, revised Stealth tranny.

- 2. Team Losi Double-X 'CR'
- 3. HPI RS4
- 4. Team Losi XX-4
- 5. HPI Nitro RS4
- 6. Team Associated RC10LS
- 7. Team Losi Double-X
- 8. Tamiya TA03F-Pro
- 9. Team Associated RC10 Worlds Car
- 10. Kyosho MP-5

RUCKS

Team Associated RC10T2

This time around, we have a new victor in the truck category—Team Associated's RC10T2 was voted best of the best. While the T2 is slightly different from its buggy cousin (one of the major differences is that it retains an aluminum, tub-type chassis), it also shares a few similarities. With the T2, you also get the race-winning, hard-anodized Team Shocks and the efficient and compact Stealth tranny, as well as rugged, molded-composite suspension arms. Team driver Mark Pavidis recently piloted his T2 to victory at the NORRCA Truck World Cup.



Tekin BC112C
Tekin's BC112C AC/DC Power-Flex peak charger squeaked out last

Tekin's BC112C AC/DC Power-Flex peak charger squeaked out las year's champ, the Competition Electronics Turbo Thirty, as our readers' favorite unit. The BC112C has a built in 24V/10A power supply; it can charge anywhere from 1 to 12 cells, and it has a custom LCD, with readouts of volts, amps, charging time, charge capacity and peak voltage. The charger also has three

charging modes and is, in a word, "versatile." You can add another charger to form a dual-charging setup, or you can add on Tekin's optional DIS350 discharger for cell matching and testing.

- 2. Competition Electronics Turbo Thirty
- 3. Novak Rhino
- 4. Novak Digi-Peak Plus
- 5. Tekin BC110L
- 6. Victor Super 102
- 7. Dynamite Mega 2
- 8. AstroFlight 115D Peak Charger
- 9. Tekin BC112A
- 10. Tekin BC48

Trinity Midnight This must be the year

of the stock motors-Trinity stock motors, to be exact! All three of Trinity's current stock motors-the Green Machine 2, the Midnight and the new X-Star-all made the Top 10, but the Midnight barely edged out the X-Star for the front position. The Midnight is tops with our readers because of its torquey powerband, its strong, 5.2 wet magnets, and its short-stack slotted armature with Thermal Transfer Gateways.

- 2. Trinity X-Star
- 3. Trinity Dirtinator 2
- 4. Trinity Dirtinator
- 5. Trinity Green Machine 2
- 6. Race Prep Hack Attack
- 7. Reedy Firehawk
- 8. Reedy Sonic 2
- 9. Peak Performance Nightmare
- 10. Trinity Buggywald

Brian Kinwald

Look out below! It's a landslide—a landslide victory for Team Trinity's Brian Kinwald, that is! Brian captured the coveted crown of top driver for the second year. The multinational and world champ is fast at any form of racing. Be it off-road, on-road, or even gas, he's one racer whose presence should make you sweat a little if you line up next to him on the drivers' stand.

As an interesting side note, in each category, we usually receive a few "notable" votes that catch our eye. In the Drivers category, a few people broke into the Top 10 who, we felt, also deserved some recognition. They are: new ROAR champ Chris Bing and relative unknown Ric Keen (driver of the 300ZX in the Nissan commercial). We even received a vote for the little GI Joe dude who piloted the 300ZX!

- 2. Mark Pavidis
- 3. Matt Francis
- 4. Greg Hodapp
- 5. Joel Johnson 6. Cliff Lett
- 7. Chris Bing
- 8. Masami Hirosaka
- 9. Ric Keen
- 10. Mike Swauger





Airtronics Caliber 3Ps

Finishing tops in the hearts of our readers for the second consecutive year is the Airtronics Caliber 3Ps. This 3-channel radio features a superfast response, three-model memory, one-touch trim memory,

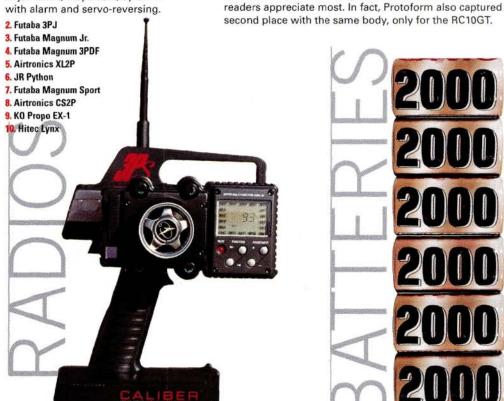
a large, easy-to-read LCD, adjustable-rate control (ARC), response control switch (from slow to fast), end-point adjustment, variable dual-rate steering adjustment, stopwatch/lap timer with alarm and servo-reversing. 2 Futaba 3PJ 3. Futaba Magnum Jr. 4. Futaba Magnum 3PDF 5. Airtronics XL2P

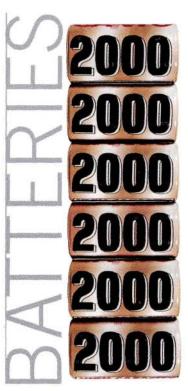


Protoform's RAMbunctious ET body for the Team

Associated RC10T and T2 provides the style that our

- 4. HPI Viper
- 5. Protoform Nevada
- 6. Dahm's Slammer
- 7. Team Associated B2 body (stock)
- 8. Protoform Nissan P35 GTP
- 9. Protoform B2 Bomber
- 10. Hot Bodies Ford F-150





Trinity Sanyo RC-2000 cells

The new king of capacity and leader among our readers is the new Sanyo RC2000 cells distributed by Trinity. These new cells are more stable through rigorous charging/discharging cycles, they're more durable and powerful, and they last longer, too, thanks to the added capacity!

- 2. Trinity Ex-Tech 1700 SCRCs
- 3. Orion V Max cells
- 4. Orion 1700SCRCs
- 5. Trinity Amp Max Plus 1400
- 6. Orion Active Sport packs
- 7. DuraTrax Piranha
- 8. Trinity Zip packs
- 9. Trinity World-Tech 1700 packs
- 10. Trinity Panasonic P170s

The new Novak Cyclone found its way to the top of the chart this year. Why? How about 256 steps for forward and brake, an operating frequency range of 122Hz all the way to 23,400Hz, three built-in performance profiles, the ability to link up to Novak's optional ESC Profile software (which allows the user to change the controls' working parameters) One-Touch Set-Up™, new solder posts, and too many other features to list.

- 2. Novak Tempest Pro
- 3 Tekin G-12C
- 4. LRP ICS Digital
- 5. Tekin GX9 Supersonic
- 6. Novak Duster 2
- 7. Novak Rooster
- 8. Tekin Rebel
- 9. Novak Hammer Pro
- 10. Novak Racer

R/C INNOVATIONS

ver the years, we've seen many noteworthy items come down the pike that have significantly changed the face of R/C. The following 10 items are just a handful of important innovations that we, the editors, agree are among those that have altered how we participate in R/C today.



by John Howell

FM radio systems

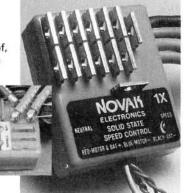
Sub-trim, multiple-model memory, onboard lap timers, FM and PCM modulation and electronic EPA adjustment are just a few of the revolutionary features that most, if not all, current FM radio systems have in common. At this rate of improvement, we'll soon be wearing the radios on our heads, controlling our cars with brainwaves



High-frequency ESCs

Since the early 1980s, ESCs have provided greater reliability and run time. Time marched on, and as the ESCs' MHz went through the roof, features such as silky-smooth throttle response and regenerative capabilities and single-step

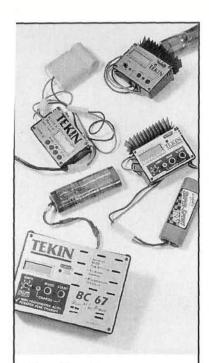
setup became the norm. Across the board (the "printed circuit board" that is, ha, ha), high-frequency ESCs have evolved into items that everyday R/C'ers choose as one of the first mods to make to their new R/C vehicle, if not the first.





Silicone shock oil

Don't take this stuff for granted. Thanks to companies such as Team Losi, Team Associated and Trinity, it's now easier to set up and tune our race vehicles consistently when we use this viscous wonder of the earth. Think we're crazy? All right, then, think back to the days of that horrible, orange goop in a bottle that we all called damper fluid. Eeewwww—in-con-sis-tent!

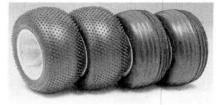


Peak chargers Let's turn back the hand of time

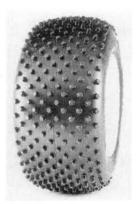
Let's turn back the hand of time (by 15 minutes, to be exact) and look at all those poor battery packs we smoked because we knew we could get that little added bit of juice into them if we gave the timer knob on our old dial charger another turn. Peak chargers are now the reliable choice of most R/C'ers who charge their packs regularly. At any big race, we highly doubt that you'll see a pit table without one.

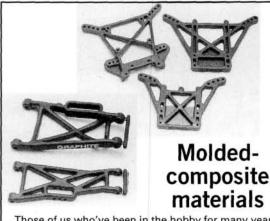
Soft compound off-road tires

Back in the old days, most off-road tires featured tread patterns that you might have seen in a Mad Max movie. They were also as hard as rocks! Today, we're lucky that Pro-Line and Team Losi make ultrasoft compounds that help us stick to the track as if we're in a slot-car groove. As time and technology march on, more and more of these



softer tire compounds benefit from countless hours of R&D; now, they actually last longer while becoming softer!



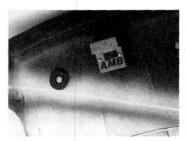






SCRC batteries

Boy, wasn't it fun charging those yellow SCEs and then running them once a day! What?! You mean you used to fast-charge them and run them over and over again? Geez! Those cells were as unstable and as frail as Chris Farley and David Spade holding vials of nitroglycerin. Well, maybe they weren't that bad, but they were bad. Along came much more reliable and resilient SCRs, and eventually, even better SCRC cells entered the picture. Now, SCRC cells with 2000mAh are the norm, and the days of having problems making run time seem to be behind us.



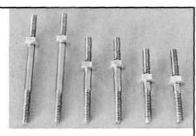
AMB lap counting

"I'm winning, I'm winning!" "No you're not, I'm winning!" "Sorry guys, I took the lead a long time ago." "You guys must be crazy! Don't you remember when you all got piled up together in that first turn? I passed you all and I'm leading the race!"

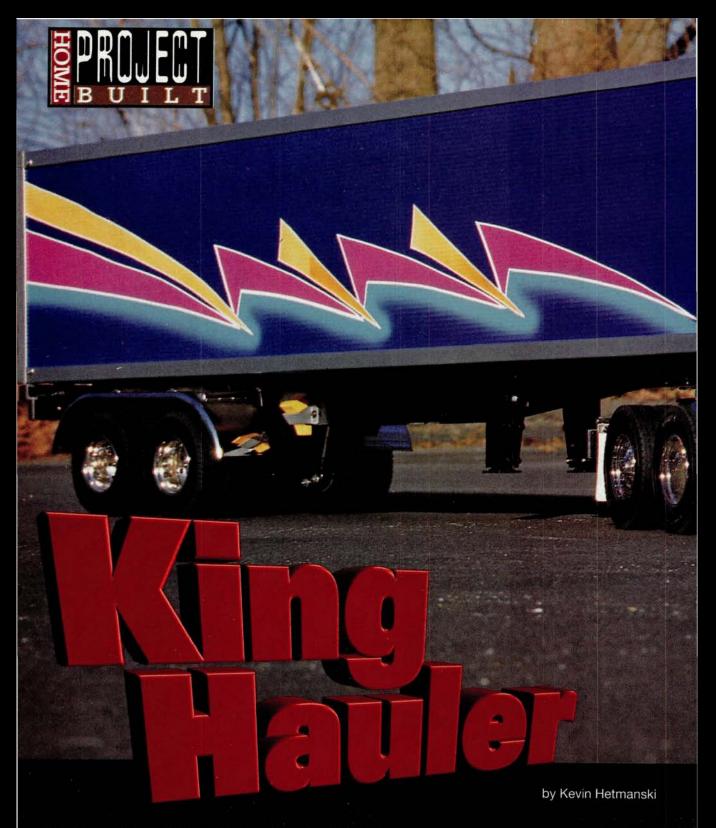
Phew! Thank God those days are over.

Turnbuckles

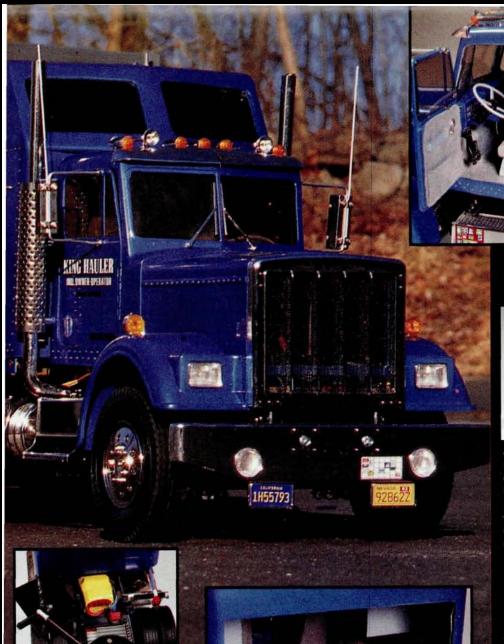
Remember the dreaded threaded rod? Yes it's true, back in the days before there were turnbuckles, we adjusted our cars' toe and camber by shortening or lengthening the threaded rod. To make the adjustment, we had to pop off the linkage, unscrew or tighten up the ball



cups, then pop the linkage back on. Now, thanks to adjustable turnbuckles, we can alter our settings with a quick turn of a wrench, without having to take the handy little sucker off the car. Available in steel and much stronger and lighter titanium, these items just shouldn't be overlooked!



HEN I CAUGHT a glimpse of Tamiya's* awesome King Hauler, I knew that I had to get my hands on it. The King Hauler is a work of art in stock form, but before I ordered mine, I already knew what I needed to make it better. The main thing I wanted was a fully detailed cab and sleeper interior. There are a few minor problems with doing this. One was that the gearbox sits high in the frame, and that interfered with the floor of the cab. The second was that I wasn't able to lower the gearbox because of the way it is mounted on the frame, which meant that the cab definitely had to rest on the gearbox.



Hop in, turn the key, and check the road conditions on the CB radio. The King Hauler's interior can now be accessed through functioning doors. Inside, you'll find all the creature features you would expect to find inside of one of these rigs. Love the velour seats

and carpeted floors! Heck, the throttle, clutch and brake pedals actually work.



In case you're wondering: no, on the stock kit, the hood doesn't tilt open. Hinges make this hood functional. Under the hood, you'll find a Trinity Midnight Stock motor. Check out the "rivets" on the cab hundreds of pinheads painstakingly installed.



Above: the electronics are usually installed in the sleeper cab, but that just wouldn't do. The author moved the electronics to make room for the cab's interior.

Above: getting sleepy? Wonder why. Hmm ... do you think the author was once in the Navy? The sheets have a standard 4-inch Navy turndown. Got a quarter? Right: details, details ... got to have those details. The King Hauler comes with plenty of chrome accents, and fiberglass over balsa was used to extend the sleeper.

Yes the lights do work!—a combination of Tamiya and RAm candle power. This rig is so awesome that we wondered whether it had ever seen the asphalt; in fact, its owner runs it often—very slowly, of course.

Three screws hold the halves of the gearbox together, and they sit higher than the rest of the gearbox. First, I built the floor and firewall out of sheet plastic. To make the floor, I simply placed the cab on the plastic and traced the outline with a pen. Then, I carefully cut out the pattern with a sharp X-Acto blade. After I cut out all the pieces, I sanded them to take care of any rough edges and glued them in place. To make the truck cab sit low on the frame, I simply drilled holes in the floor of the cab where the screws protruded from the gearbox.

Now for another problem. Where in the world was I going to fit all the electronics? The electronics are supposed to be hidden in the sleeper. Because I wanted to have a detailed interior, I didn't think that a battery and speed control would look right sitting in the sleeper of the cab. I noticed that the frame had a lot of unused space, so that's where I put the electronics. First, I cut a strip of aluminum and attached it to the cross members from the rear of the frame to the front of the chassis where the rear of the gearbox is. I then installed the speed control, receiver and battery pack in between the frame rails on the strip of aluminum.



Pop the hood to access the motor and servos. The Trinity Midnight stock motor has the torque that's needed to pull this big rig.

The circuit board for the Tamiya ligl kit also needed a home, so I mounts that on top of the frame rails just und the sleeper cab so it would not be visibl To cover the electronics, I added di mond-plate plastic to the top of the frame.

To dress up the chassis a little more, added the aftermarket Tamiya blue oi filled shocks. Hidden underneath the trailer is a RAm* engine sound unit and RAm extra-control unit to control the RAm lights under the sleeper and the a horn sound by remote control. I als added the trailer lights so the trailer would look as good as the truck at night.

Once I had solved all of the problem with installing the electronics, I move on to the cab. Because I wanted to hav an interior, I also wanted the doors t open. I removed all the doors from th body with an X-Acto blade so that the could be hinged to swing open. After cuting out the doors and shaping them s they fit tightly, I then added the hinges. chose Sonic Tronics* hinges. To fit m application, I modified the hinges slightl by using two hinges to make one.

I made the extension to the sleepe using balsa wood. Once I was happy wit the construction, I then coated the bals

WE'VE PUT THE STA





When you're ready to fire up your on-road gas racer, fire up your computer first. Log onto the Team Serpent Network web site and check out our ever-expanding gas track directory, complete U.S. and world-wide racing calendars, track photos, contact numbers, maps and much more – total info for all the on-road nitro action in your area and beyond. Start your modem. Then, gentleman, start your engine.



E-mail: Serpent USA, Inc.: serp-usa@ix.netcom.com Serpent b.v., The Netherlands: team@serpent.nl

with fiberglass and resin. I removed the top to the original sleeper with a saw. When I had removed the top, I attached the extension with CA. To add strength to the joint, I covered the line between the cab and the extension with a strip of fiberglass and resin. After the resin had dried, I filled and sanded the area until the line was no longer visible.

The body comes with rivets molded in the plastic. These rivets look nice, but with all the sanding of the body, they start to wear down. I removed all the molded-in rivets with a Dremel* tool and a grinding stone. I filled and sanded the areas where the rivets were ground down. Then, I drilled pilot holes where the old rivets were so I could put in pinheads. The pinheads look just like rivets and they're chrome, so they look nice, too. I installed the pinheads after I had painted the body.

I removed the hood with an X-Acto knife so that it could be hinged to tilt. After I had made the mount for the hood and hooked up the hood, I noticed that the air cleaners on the cab intefered with the fenders, so I removed the air cleaners and filled all the holes with plastic and filler.

The back of the cab has a removable

cover that's used to gain access to the sleeper. I was going to glue this shut, but I decided not to so that the sleeper would be easier to work on and to see the interior better. Originally, the cover was attached with two clips that slid back and forth. I removed both clips and filled the holes and then used Velcro®-brand fasteners to hold the cover in place. This gave the back of the truck a more realistic look.

I used miniature smoke units inside the smoke stacks for a realistic exhaust look. The smoke stack has a removable tube on top with a plastic body. I placed the smoke units in the tube and simply ran the wires through the plastic body. A big 12V gel-cell battery is hidden in the trailer to power the smoke units.

After all of the body work had been done, I painted the cab with four coats of Testor's* True Blue Pearl paint followed by three coats of Testor's clearcoat. After the body had dried for two weeks, to get a great shine, I polished the paint out using a polishing kit. To jazz up the trailer, I painted it blue to match the cab, and I added graphics to sweeten the package.

I completely carpeted the interior of the cab with fabric I had picked up at a fabric store. I added plastic to the bottom of the dashboard to make it look more

realistic, and then I painted it blue to match the body. The gas, brake and clutch petals were made of plastic strips. The stick shift was made of metal and plastic, and I made the velour seats by covering them with glue and dumping velour powder over the wet glue. Once the glue was dry, I brushed off the excess powder. There are many more odds and ends that have to be added to the interior of the truck to add to the realism.

I use a 4-channel Airtronics* radio to guide this beast. A Tekin* Rebel speed control supplies the power to the Trinity* Midnight motor. To steer and shift the truck, I opted to use standard Futaba* servos. For hood-tilting action, I chose a Hitec* mini servo.

I hope you like the truck so far. It took me six months to build my King Hauler. As time goes by, I will add more details to this great rig. I am far from being finished. Stay tuned!

[Editor's note: as we go to press, Kevin's King Hauler has just been awarded first prize at the '97 WRAM show in Westchester, NY.]

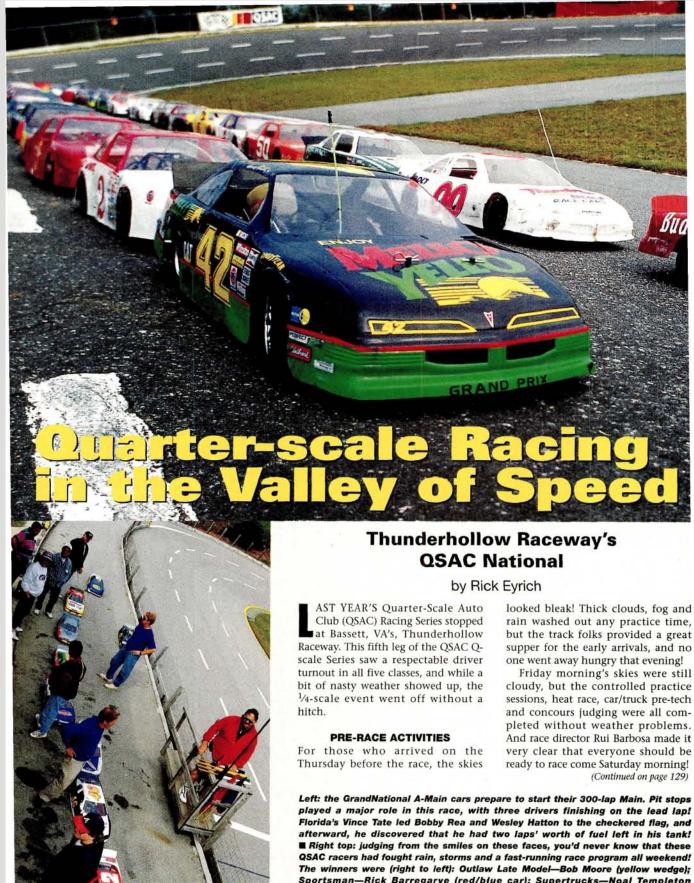
*Addresses are listed alphabetically in the Index of Manufacturers on page 201.

ON-LINE. ING E,



www.serpent.nl





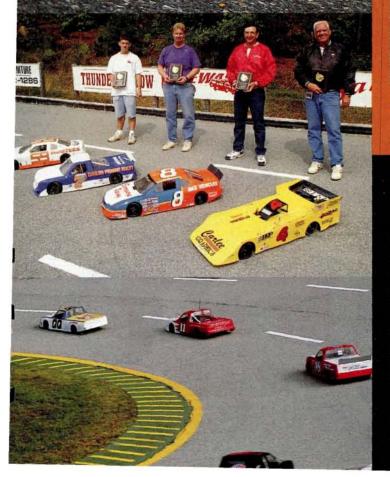
played a major role in this race, with three drivers finishing on the lead lap! Florida's Vince Tate led Bobby Rea and Wesley Hatton to the checkered flag, and afterward, he discovered that he had two laps' worth of fuel left in his tank! ■ Right top: judging from the smiles on these faces, you'd never know that these QSAC racers had fought rain, storms and a fast-running race program all weekend! The winners were (right to left): Outlaw Late Model-Bob Moore (yellow wedge); Sportsman-Rick Barregarye (red/blue car); Supertrucks-Noal Templeton (white/blue); and GrandNational—Vince Tate (white/orange car). ■ Right bottom: the Supertruck A-Main came down to a battle between Lightning drivers Noal Templeton (shown here leading the pack) and Andy Allen. The new QSAC Pickup class has become very popular because of the trucks' stability and because they can be altered during the between-segment time-out periods.

WHAT IS OSAC?

QSAC, the Quarter-Scale Auto Club Inc., completed its second National Championship Series last year. Six events made up the 1996 schedule, including stops in Texas, Illinois and Florida and at the Amoco/Knoxville Sprint Car Nationals in Iowa. The QSAC folks strive to provide their racers with two things: an enjoyable, well-run race program and a level playing field—fair rules for all. Thanks to this philosophy, the QSAC achieves another important goal: it provides a competitive and fun racing series for anyone interested in large-scale R/C cars! For more information, contact Judy Keith, QSAC, 24625 West 71st St., Shawney Mission, KS 66277; (913) 441-6440.



In R/C track loaded with 1/4-scale R/C vehicles is the main goal at any DSAC-sanctioned event. A tight rules package makes all of these large-scale stock cars very close, performance wise, and the main focus is on competitors! abilities to set up and drive their cars.





¹/4-Scale Chassis Specs

Although the QSAC ran five separate classes at Thunderhollow, the same basic chassis design and running gear were found in all. A chromoly tube steel chassis houses either a 1.2 or 2b.hp Zenoah* 2-stroke engine, fully independent suspension, dual-servo steering and a centrifugal clutch/cogged belt-drive system. WCM*, Lightning and New Era* cars make up the bulk of the field, but some racers scratchbuild their cars. Band-capped rubber tires allow stagger changes, thick Lexan bodies hold up in large-scale crashes, and high-powered radios keep the 1/4-scale cars and trucks running strong.



The WCM car (top) and the Lightning (above) are two good examples of the '/4-scale brands that were run in the QSAC Championship Series. Both use steel-tube chassis, fully independent suspensions, Zenoah powerplants, belt drive, rubber capped tires and extra-thick Lexan body shells.

THUNDERHOLLOW RACEWAY

From its tree-lined pit area to its ultra-smooth asphalt surface, Terry Rea's Bassett, VA, track is a first-class facility. Little details like a plastic-lined outer retaining wall,

groomed grass infield with drains and a wide pit lane make it a Q-scale racer's dream oval. Throw in computer scoring, a huge two-story drivers' stand and an on-site

workshop, and you have the full Thunderhollow experience! Now, if only Terry could make the steep uphill pit walkway easier on us out-ofshape folks, it would be perfect!



QUARTERSCALE RACING IN THE VALLEY OF SPEED

(Continued from page 127)

RACE DAY NUMBER ONE

High humidity, cool temps and black clouds on Saturday meant several things to the QSAC crowd—minimum lag time between the heat races, quick turnaround for anyone who was running two classes and little time to worry about much more than making the A-Mains!

For most of the day, everything went smoothly for the large-scale competitors. Two full sets of heat races for all five classes were completed by 2 p.m., and the B-Mains were in the books by 3. Wayne Burroughs claimed the Novice Main, and just as the Sportsman Grandnational A-Main started, raindrops began to fall.

Georgia's Brian Hess led the race from the green flag, but heavy rain halted the A-Main and the day's race program at the halfway point: 100 laps. This meant that the final 100 circuits would have to be run on Sunday, the rain date, along with the rest of the A-Mains. So with all the Sportsman class cars impounded until the following day, all the racers could do was wait until Sunday and hope for better weather!

RACE DAY NUMBER TWO

Come Sunday, clear and cool weather was the order of the day. Some racers had to rebuild their pit canopies because of a brief storm the previous night, but everyone was set and the track was dry by midmorning.

- Sportsman A-Main part two. The impounded ½-scale cars re-gridded for their A-Main and had only one caution/yellow flag for the whole 100 laps. Early leader Hess had spark-plug failure and turned the lead over to Rick Barregarye, who went on to record his first QSAC Nationals victory. Cliff Scales took the second spot overall while Hess recovered to finish third and secure the class championship for the '96 season.
- Supertruck A-Main. The Supertruck twin 100-lap segments came next, and once the pickup drivers had settled their nerves, it was an exciting race for the entire 200 circuits. Noal Templeton and Steve Bloser ran one-two throughout the first segment, but Bloser lost a lap early in the second 100-lapper and ended up third overall. Templeton maintained his lead until the finish, closely followed by fellow Lightning truck racer Andy Allen and Bloser.
- Outlaw Late Model A-Main. The drivers of these high-powered, high-strung, ¹/₄-scale, late-model wedges had their hands full during their 100-lap Main! The previous day's rain had removed much of the accumulated rubber from the track

surface, and these cars need that rubber to grip the asphalt. QSAC Outlaw regulars Bob Moore, Todd Bishop and Sam Burton all took turns up front, but because of a bizarre occurrence, the race ended up being a one-lap dash to the checkered flag. Both Bishop and Burton ran out of fuel with four laps to go, but Moore waited for them and set up the one-circuit run to the finish line. Moore slipped across first with Bishop and Burton right behind for second and third.

• Grandnational Stock Car A-Main. This was the weekend's big finale. Three hundred laps, nine racers with their cars and the challenge of making the fewest fuel stops possible! QSAC rules state that the Grandnational cars can use only an 8-ounce tank. And since most cars get 100 laps per tank, some thought that cars would have to pit at least three times to make the checkered flag.

So with that in the drivers' minds—plus the usual itchy throttle fingers—it's not surprising that it took four complete restarts to get the A-Main under way! Polesitter Gary Walsh led the first laps, but when his car's fuel system began to act up, Bobby Rea and Wesley Hatton took turns leading the field. Several caution periods

and fuel stops scrambled the running order somewhat, but the battle for the win was between three drivers—Rea, Hatton and Vince Tate, who started the Main in sixth. All three were locked together on the lead lap for the last 100 circuits. Toward the end, Tate was able to keep about a quarter lap between his vehicle and the Rea/Hatton battle for second, but would all three have enough gas to finish?

As it turned out, they did, and when the checkered flag was waved, it was Tate first, Rea second and Hatton third, all within 4 seconds of one another after 300 laps! Besides the excitement of Vince's first big QSAC win, his Lightning car had only enough gas left to run about two laps—tops!

QSAC NATIONAL WRAP-UP

Even with the weather glitch, the Thunderhollow QSAC Nationals received high marks from everyone who attended. And you can be sure that the next time the QSAC returns to this southern Virginia track, this fellowship of large-scale R/C gas car competitors will return as well.

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.



RC10B2

901 Top Front Brace 902 Baddery Strap 903 Tranny Brace

9120 Cross Brace 9210 Front Kickup

9240 Rear Chassy Plate 9245 Motor Mount

6220 Front Axles 6463 Shock Caps

RC10T2

701 Nose Bars 702 Baddery Strap 7208 Cross Brace

7301 Chassy 7305 Nose Plate

7370 Motor Mount 7371 Motor Guard 6220 Front Axles

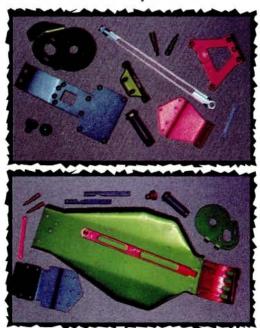
6220 Front Axles 6463 Shock Caps

Also

All RC10GT parts All RC10DS parts XX Battery Strap

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Get into Drag Racing on a Budget





Above: here's what happens when competitors let thei eyes focus on something other than their own drag lane! This car veered toward the strip center line and hit the finish-line light beam. This virtually destroyed the chassis plate, steering servo, front axle and body.

Left: this is what electric IEDA-style 1/10-scale drag racing is supposed to look like: two fast vehicles running side by side to the finish line! And by using some of the tips mentioned in this article, you'll ensure that your dragger performs just like these.

cheapSPEED



how tough can it be to go straight for 132 feet?" You think you'll just punch the throttle, zip down the strip and set a

speed record-no problem!

Well, though this type of R/C car racing isn't rocket science, it also isn't as easy as it looks. But I'll show you how to give this awesome form of racing a try without breaking the bank, and I'll also show you how to get down that scale quartermile without making a mess of your new race rig!

With that in mind, let's apply some basic drag-vehicle setup/driving tips to one particular inexpensive car—a Bolink* Legend. The Legend may not be considered a hardcore drag-racer, but the main idea here is to create a simple drag car that's enjoyable and competitive to run. I also recommend that you read Mike Ogle's "Get Started in R/C Drag Racing" (September '96 issue of Car Action)—informative stuff!

CHASSIS CHANGES, FRONT TO REAR

My Legend already had a standard Futaba* 148S servo for the steering, but for the drag version, I decided on a 132H unit. This gives the quick steering many R/C drag racers prefer, but those on a budget could stick with the 148. I reduced the servo steering rate by a third for one reason: without the reduction, over-correcting during a pass down the strip could lead to a really ugly crash.

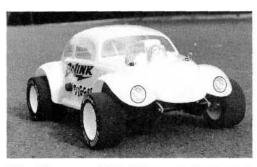
If the chassis is set up correctly, you'll need only minimal steering, so first, check your tire diameters. Yup, unlike the Bolink's require-

ment on ovals, it doesn't need any tire stagger to drag race! I measured the front and rear tire diameters accurately to make sure they were equal because this makes it much easier for the car to run straight and true down the strip.

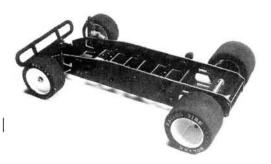
Moving to the rear of the Bolink frame, I removed the car's diff-equipped axle, hubs and tires and replaced them with the following pieces:

- · Bolink Digger axle-part no. 5745;
- Kimbrough* 72-tooth 48-pitch spur gear—no. 153;
- · Green-compound foam tires;
- Pair of BRP's* pure magnesium wheel hubs (no. 6756).

The BRP hubs use double-pinch grub screws. After a bit of axle filing, I firmly attached the hubs to the Digger shaft.



This mild-mannered Bolink Digger was transformed so it could go dune surfing on the family beach vacation. Here's what it looked like before it was converted into a pro-stock drag racer.





Your drag-car body should be painted a solid color; a semi-transparent shell won't trip the light beams found on most strip scoring systems! Notice how much lighter the piece of Lexan on the bottom is. Both strips have been painted with the same color paint, but the one on top was back-coated with silver to make it solid and drag ready!

They ran true right out of the package, and I recommend them for any straight-axle R/C car!

A pair of Lockmann Precision RC Products* O-ring front drag wheel/tires completed the chassis mods, and I also added the Bolink ball-bearing set (no. 5457).

To finish the conversion, I gave the chassis a Dahm's* Virtual Phantasy coupe body and rear wing. (BRP nylon rivets hold the wing on the shell.) I used Lexan "L's" and servo tape to fix the 'chutes and homemade 0.030-inch-thick Lexan side dams in position. With that, the converted Bolink car was ready to go.

TESTING

OK; how does the revamped Bolink drag-

ger run? Well, test runs have shown that it would make an excellent first-timer's drag car. On a makeshift parking-lot strip built with surveyor's tape and sandbags, after I had tinkered with the steering trim and tire rollout on the chassis, the Bolink ran straight down the asphalt.

A beginner R/C drag fan can run a car like this modified Legend and be competitive in a beginner, or bracket, class. Of course, you don't have to make all the changes shown here, and you could make even more, but this vehicle will work—period.

So if you suddenly find you crave some drag-racing action, remember what I accomplished with this Bolink car. It began as an oval-track racer, and now it's just as happy running down 132 feet of tarmac—super-fast!

*Addresses are listed alphabetically in the Index of Manufacturers on page 201.

Drag Racing Tips

earn from my experience, people.
In the long run, these tips may save you some parts and money.

- If you're lucky enough to live near an IDEA drag strip or one that uses a Christmas-tree starting system, line up your car so that it's both straight with your lane and not too deep into the twin staging beams.
- Believe it or not, you car's paint job can screw up your ability to stage correctly! I made sure the Legend's body paint—especially on the front area was solid. A semi-transparent body painted with candy, pearl or fluorescent colors won't trip the staging beams properly. So I backed the yellow coupe body with a coat of white, just to be sure.
- When the car is actually going down the track, don't try to over-drive it out of trouble! This means that if the car starts to dart or lose traction, don't attempt to correct it with heavy steering action. If you do, it will end up upside-down in the other lane—or worse.
- What could be worse? you ask. How about striking a solid object at the end of your run? In the center of the strip are the trip lights that signal your vehicle's crossing of the finish line. Most of these lights are covered, and if your eyes lock on to them, there's a good chance you'll steer straight into them and damage your car—big-time!
 Another way to avoid damaging your drag car'is to use "wall friction" to scrub off speed if it starts to go out of control. If it gets squirrelly during a

of control. If it gets squirrelly during a run, steer—if you can—into the outer PVC pipes used as rails on most \(^{1}/10\)-scale drag strips. The idea is to slow the car gradually—not stop it instantly. With luck, the only damage will be some missing body paint or decals!

One of the most important factors in making good drag passes involves your tire diameters. To keep the chassis running straight down the 132 feet of track, the rear tires must have the same outside diameters. Measure them after every few



Tuning and Modifying the

TAMIYA

PAJERO

by Doug Mertes

FTER YEARS of hauling "Big Blue," the family's trusty Tamiya* Clod Buster, on our annual beach vacation, the three of us faced a dilemma. We like to take so much stuff to the beach that we were running out of room in our truckster, and let's face it, a Clod Buster isn't exactly a tiny R/C vehicle. On the other hand, its ability to scramble up and over even the most daunting sand dune had endeared it to my wife and daughter-neither of whom touch anything R/C the rest of the year. I had to figure out a way to put that same capacity for fun in a smaller package that would allow me to pack just one more boogie board in the car-top carrier.

The finished product! Big tires, more horsepower, lots of lights What's not to like? How about that homemade roof rack

That's when my eye fell on the Tamiya Pajero that had served me so faithfully over the past two years. It's tough and agile—albeit a little on the slow side—and I had had fun with this sturdy 4WD cross-country trucklet in the backyard and at the neighborhood ball diamond. I had introduced more than one house guest to the R/C hobby by teaching them to drive the Pajero, which had yet to require a single replacement part. I knew it was durable, but for the beach, it had some serious performance shortcomings.

To begin with, the stock Mabuchi 540 motor was simply too wimpy to do well in sand. I needed additional horsepower, but I also had to take the kit's limited gearing options into consideration (it accepts only two pinion sizes). The original mechanical speed control still worked properly, but experience had taught me not to overtax that

system's ceramic resistor with a strong motor under load, so I figured I'd need an electronic speed control (ESC).

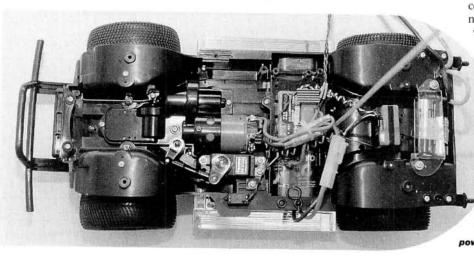
The biggest problem, however, were the tires. The originals were too hard and narrow to make it on the beach they'd dig in and leave the Pajero stuck as soon as the sand got a little soft () saw full-size 4WD trucks with street tires being towed off the dunes every day). Like with the full-scale trucks, it would be tough to fit a wider or taller tire within the Pajero's wheel wells without resorting to drastic plastic surgery, so overall tire size would also be a limiting factor. I couldn't just stick some fat, soft donuts on there, because mondo tires would scrape and catch on the edges of the wheel wells.

CALL THE EXPERTS

I decided to contact manufacturers and ask for help. First on my list was, of course, Tamiya America. They market a number of 4WD off-road buggies with wheels that use a hex drive of the

same size as the sedans and crosscountry chassis, but their rims are larger (either 2- or 2.15-inch diameter), and they have more or less offset (where the wheel's center disk is in relation to the inner rim) than the original parts. I explained the project to Tamiya's cus-

The Novak Explorer ESC and Polaris receiver snuggle right into the chassis tub. They should provide years of reliable service. A Trinity Midnight motor provides more power without tearing up the gearbox.



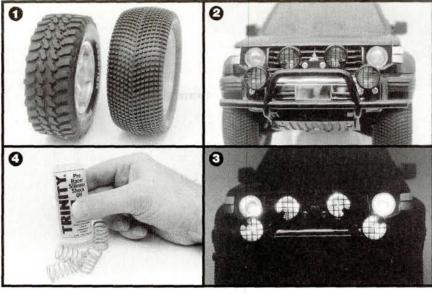
tomer service manager; he dug through their parts bins and came up with a number of wheel, tire and shock-spring options to experiment with.

Next, I called Novak* Electronics. I needed a speed control that would be able to feed voltage

to a strong stock motor under stress, but I didn't want to spend an arm and a leg. They recommended one of their Fun Series controls—the Explorer. It's not only rugged, but it's also their least expensive ESC, even though it has many of the features found on pro-level race units. I knew I planned to install one of Novak's Polaris AM receivers because they're tough to beat when it comes to signal reception. A Futaba* \$148 standard servo was already doing a fine job of handling steering duties, so it got to stay in the chassis tub.

My third call went out to Pro-Line*. I had some questions about which tires might fit in the body's wheel wells. I eventually chose Pro-Line Rally Hawg tires for both ends, and combined them with the wide rear and narrow front rims from Tamiva's Dirt Thrasher off-road car: everything fits just fine. On the narrow rims, the fronts kind of "pooch" out a little more, but wider rims would catch on the steering arms at full lock. Using this combination, there's absolutely no binding between the tire, chassis and body over the entire range of steering and suspension travel. But the Rally Hawgs are wider and softer than the kit tiresenough to allow the truck to float over the sand. Tamiya's optional red shock springs proved too soft for this project, so I went back to the kit springs and filled the shocks with Trinity 40WT fluid.

Only one more call to make: ExCell Products*. I visited their outstanding website and read about their products in *R/C Car Action*, so when it was time to obtain a few fresh Sanyo 1700 SCRC stick packs, they got the nod. I installed a Trinity Midnight motor using a Tamiya 20-tooth pinion (I also took along a 16-tooth in case this proved to be too much gear for the motor to handle), and I cycled the batteries twice to prepare for the tests.



Rally Hawgs are the same diameter as the stock tires, but they're much softer and wider. 2 & 3. Lights, lights, lights! There are plenty of wires, but the circuitry is really very simple. 4. The folks at Tamiya America sent some optional shock springs, but for my purpose, I found the kit springs bestalong with some **Trinity 40WT silicone** shock fluid.

1. These Pro-Line

DELUXE LIGHTING

We weren't quite ready to hit the dunes. Although I installed a set of four minimag-light type bulbs in the headlight and fog light buckets when I built the Pajero (see Radio Control Car Action, February 1995), I wanted more candle power. I also wanted the truck to look as stock as possible, so I obtained the parts trees containing the pieces necessary to make another set of fog lights. After cutting the mounting bracket in half, I mounted one additional light on each side of the front bumper's brush guard-protected from being damaged when I cut corners too tight. Trust me; on dark, moonless nights at the beach, six of these bulbs throw out a lot of light!

I capped off the lighting part of the project by installing a set of Novak's brake-light LEDs; they are powered by the Explorer ESC and are easily connected to it. I had to shave and shape the orange LED holders to fit the inside of the Pajero's body, but it wasn't very difficult. Because the body is hard styrene, not Lexan, on each side, I drilled a hole in the body casting for the red, upper taillights to shine through. This was easy to do and added yet another level of realism to the finished project. Whenever the brake lights come on, onlookers "Ooh" and "Aah."

RACKED

Something was still missing, but I couldn't put my finger on it. Then my daughter pointed out that the Pajero lacked what every other full-scale truck on the road sported: a roof rack to hold surf boards, tires, or extra luggage. I did some research, but I couldn't find a company that made a realistic roof rack to fit. That's when I visited Grandpa's Hobbies in Annandale, VA, to check out their model making supplies. Their customers are primarily interested in train layouts

and static scale models, so the store has a complete selection of Plastrux styrene materials. For less than four bucks, I had all of the materials I needed to build the rack's framework, and also some ProWeld plastic bonding—a CA-type glue that joins hard plastics in 10 seconds. I cut all the upper, curved pieces out of the parts trees that the fog-light parts came on. I put the whole thing together on a single rainy afternoon, and painted it with a mixture of Pactra* black and silver paints. I knew that the paint was meant for Lexan, but since I didn't want a shiny finish, that wasn't important to me.

TIME TO GET SANDY!

When the reborn Pajero first hit the beach, I knew that all of my planning and hard work had been successful. The truck rides easily on top of even loose, dry sand, and it has yet to get stuck traversing a sand dune. Its ride height is just right: not tall enough to be tipped over easily when skipping down the face of a dune or hill, but still high enough to escape the moisture of occasional surf forays.

My wife and daughter really dig the truck's realistic appearance (they've never appreciated the looks of R/C racing trucks), especially with the lights and the roof rack. The truck's tub construction and sealed bearings seem to be resisting sand damage, but I keep a close eye on things and brush off all the sand at the end of the day.

The folks at Tamiya America, Novak, Pro-Line and ExCell Racing were a big help. Even though I called with some really weird questions, they took the time to listen to me and solve some of my bigger problems.

*Addresses are listed alphabetically in the Index of Manufacturers on page 201,

(Continued from page 73)

condition no doubt helped in the stability department, but I can honestly say that the no-damping design didn't limit the car as far as just-havin'-fun driving goes.

Here's a nitro Mantis tip for ya, wrapped up in a nice crash story. Between some rough driving and the vertical mounting of the receiver, my receiver crystal managed to vibrate out. As (bad) luck would have it, the crystal and the receiver parted company while the front wheels were straight and the throttle was wide open. The runaway Mantis went from wide open to really wide open to oh-my-God-it'sgonna-blow as it rapidly sucked up the length of the parking lot. The Mantis missile then launched itself about 15 feet in the air off the beveled end of a parking block, cartwheeled a few times in midair and landed 24 feet away (I measured) upside down in long grass with the right rear wheel dug in. Mind you, the car was still wide open, so the diff was unloading into the free left wheel and spinning it fast enough to warp time. As I finally reached the car, the motor leaned out as the last drop of fuel in the line was sucked through the carb. This gave the motor one last burst of speed to send the ballooning rear tire flying right off the rim. As all this was happening, I was ticking off what I would need to get the car rolling again: piston, sleeve, maybe a conrod ... front suspension arms for sure, maybe a front bulkhead. Total losses? One antenna tube and the rubber stinger from the exhaust pipe, all of which flew off the car and were lost in the grass. I did get the tire back at least. After I let the car cool, it started right up and ran

fine! Pretty tough stuff there, Kyosho. Oh yeah, the tip: tape in your receiver crystal!

FINAL THOUGHTS

There are three attributes any beginner or entry-level car should have, and both the nitro and electric Mantis cars have 'em: durability, simplicity and reliability. Both are easy to work on and bomb-proof, and they performed without a hiccup. This is exactly what it takes to keep the newcomer in the hobby; wrestling with a finicky, high-strung car isn't fun for those of us "in the know," let alone the first-timer. What's also nice about these cars is a high "keeper" factor. These cars can grow with new drivers as they get more experience. I wouldn't hesitate to upgrade either car for racing if a class for either variety opens up. I'm especially fond of the electric car for its extra-low center of gravity and laydown tranny; I'd love to add Kyosho's bearings, adjustable camber links and oil-damped shocks with the shock mount kit. I'm sure it could run with Associated's* Dual Sport car, and it would be killer for "gearbox class" racing at the local carpet oval. Want to go fast without much hassle? Get a Mantis and go nuts. They're quick and easy to operate to boot—a rare combo. The versatility of these cars is a real plus, too; you can change the look as often as you like with any of the narrow sedan bodies available, and the aftermarket wheel and tire options seem limitless. All in all, Kyosho's Mantis cars are a great way to get started in R/C today without getting left behind tomorrow.

*Addresses are listed alphabetically in the Index_of Manufacturers on page 201.

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For more recycling information call: For Individuals, (800) 8-Battery For Retailers, (770) 984-0708

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Protoform; distributed by Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

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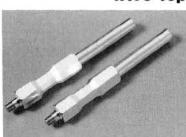
designed to fit an ½-inch shaft, are also useful for tightening the A-arms on your vehicles.

Part nos. and prices—450-459 (small armatures), \$35; 470-475 (large armatures), \$35; 442 (standup endbell), \$24; 443 (laydown endbell), \$24; 445 (motor can), \$24; 446 (shim kit), \$2.50.

Reedy Modifieds; distributed by Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; tax (714) 850-1744.

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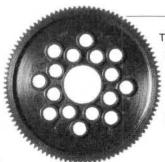
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Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 352-

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Phenix Raceway & Hobby, 2006 Opelika Rd., Phenix City, AL 36867; Chris Watson, fax (334) 298-9786

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ALASKA

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ADZEGEM

Fairbanks R/C Car Club, 510 Janeau Ave., Fairbanks, AK 99701; Dan Anderson, (907) 456-5494

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Cottonwood R/C, S. 6th St., Cotonwood, AZ 86322; Sal Cirincione, (520) 567-6830

Finish Line Raceway, 7025 E. 21st. St., Tucson, AZ 85710; Spoon-Brandon-R/C, (520) 747-3633

G&S Raceway, 967 Hancock, Bullhead City, AZ 86442; Bob Olsen,

Havasu R/C Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu, AZ 86403; Jeff Roe, (520)

HobbyTown Mountain Raceway, 1500 E. Cedar Ave., Cedar Hills Shopping Center, Flagstaff, AZ 86004; Richard, (520) 214-9887

HobbyTown Raceway, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250; Dennis, (602) 948-3946

HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234;

Hobbytown Raceway, 1102 E.22nd St., Tuscon, AZ 85704; Adam Crinnen (520) 882-8888

Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave or Randy, (520) 625-9274

R/C Sports Mania, 3550 N. 35th Ave. Phoenix, AZ 85017; Brian Dick, (602) 278-3671

Scottsdale R/C Raceway, 3023 N. Scottsdale, Scottsdale, AZ 85251; Scott Anfinson, (602) 945-2186

Speedway Hobbies, 2710 N. Steve's Blvd., Suite #8, Flagstaff, AZ 86004; Gary McAllister, (520) 556-0710

Thunder Mountain R/C, 1325B Plaza Mavia, Sierra Vista, AZ 85635; Wayne Tuthill, (502) 459-4173

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R/C Motorplex, 204 Best Industry Dr., Jonesboro, AR 72401; David Hill or Kevin Brady, (501) 931-3278 ADOCE GENERAL

Superior Offroad R/C Club, 2400 Bowman Rd., Little Rock, AR 72211; John Reynolds, (501) 778-7875

Sparks R.C. Raceway, 7194 Greene 721 Rd., Paragould, AR 72450; Tommy Sparks, (501) 239-3606

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A-Main Racing, 4309 North Cedar Ave., Fresno, CA 93776; Keith Gerhke

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Cameron Park Raceway, 1305 Cameron Ave., West Covina, CA 91790; Carl A., McVey, (818) 962-

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DiscountHobby Warehouse, 7750 Convoy Ct., San Diego, CA 92111; Gary Guest, (619) 560-9633

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Geotek R/C Racing, 92 Aero Camino, Goleta, CA 93117 David Jones or Mike Atherton, (805) 961-2178; fax (805)

Gold Nugget Raceway, 4650 Skyway, Paradise, CA 95969; Marvin's R/C Hobbies, (916) 877-7363

Greater Los Angeles R/C Racing Club, 3756 Cardiff Ave., #305, Los Angeles, CA 90034; Nikko Ko

Hobby Central Raceway, 34255 P.C.H., Unit 107, Dana Point, CA

Hobby Paradise Raceway, 1880 Art Gonzales Pkwy., Selma, CA 93662; Steve Keiser, (209) 896-4804

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Lucerne Valley Raceway, 32800 Old Woman Springs Rd. #4, P.O. Box 2047, Lucerne Valley, CA 92356; Frank Rodrique, (619) 248-7305

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Nor-Cal Mini-Speedway, 519 Bush St., Woodland, CA 95695; Steve Van Atta. (916) 668-5678 ACEBAM

Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909)

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Simi Valley Groundpounders, 205 Tierra Rejada Rd. (behind Simi Val Drive-In), Simi Valley, CA. 93065; Jack Kasten, (805) 584-8211

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Stockton Raceway, 3133 N. Adart Rd., Stockton, CA 95215, Ultimate Hobbies, (209) 472-1991

Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-74

Track Heaven, 6196 Child's Ave, S Diego, CA 92139; Loure, 475-202 Tri-Valley Auto Racers, Livermore Elks Club, 940 Larkspur, Livermore CA 94550; Roger Van Maren, (510

Ultimate Hobbies, 2143 N. Tunstii Ave. #6, Orange, CA 92665; Cliff Murukami, (714) 921-0424

Valley R/C Racepark, 146 S. Santa F St., Hernet, CA 92344; Valley Wide Recreation, (909) 654-1505 or 658-

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FIC TO IT Valley West R/C Club, 2202 | Roa Grand Junction, CO 81505; Waymond Williams, (970) 242-88

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OCA K/N R/C Speedway Inc., West St. Stafford Springs, CT 06076; (860)

NERCAR, 36 Glendale Rd., Enfield, CT 06082; Phil Olsson, (860) 627-5410

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FLORIDA

B+T R/C Central, 811 Playground (Ft. Walton Beach, FL 32547; (904)

Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758

Broward County R/C Race Club, Mills Pond Park, Ft. Lauderdale, FL; Ed Decembero, (954) 525-3304

Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (954) 474-5934 or Rick Schwartz, (954) 344-1983

Fiesta 1/5 Scale Gas Oval/Road Course Circuit, 1137 Candlewood Circle, Pensacola, FL 32514; Tom Sirmon, (904) 477-6419

First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161

5-Fifty-5 R/C Raceway, State Road 555, Bartow, FL 33830; Chuck Nolke, (941) 324-7406

GainesvilleR/C Speedway, PD Box 693, Metrose, FL 32666; 130 NW 14th. Ave., Gainesville, FL 32601; (352) 495,3600

Frontier Race Track, 15260 N.E. 244th Ave., Salt Springs, FL 32134; Harold Reel and Don Combee, (352)

Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714, Dave Mottin

Hudson's R/C Raceway, 590 Madeore St., St. Decemberine, FL 32095; Steve Hudson, (904) 826-4050

Hobby World Raceway, 7273 103rd St., Jacksonville, FL; Ray or Greg, (904) 772-9022

Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322

Miami R/C Raceway, 12546 S.W. 88

Morris Kohl's Raceway and Hobby Shop, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626

My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458: Mark Watson, (407)

NORRA, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar, (941) 455-9055 or Mark Benfield, (941)

Ocala Radio Control Car Club, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Shook, (352) 694-5147

Paul's Stadium Raceway, 4511 W. Dr. N.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662

PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (407) 743-9791 or Tim Case,

Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615

Port St. Lucie Racing, 3626 SW Rivera St., Port St. Lucie, FL 34953; Frank Spadavecchia, (407) 336-8711

R/C America, 9274 Bird Road, Miami, FL 33165-4151; Dan Martinez, (305) 220-9359

Red's R/C Raceway and Hobbies, 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330

River City R/C Car Ciub, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948

Sarasota Flat Track, 4900 Fruitville Rd. Sarasota, FL 34232; Jim Wilson, (941) 371-3689

Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (941) 455-1143

Superior Hobbies R/C Parking Lot Racing, 430 E. Hwy. 436, Suite #106, Casselberry, FL 32707; Robbie Michael,

Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744

Tampa Hobbytown R/C 4 Slot Car Raceway, 15702 N. Dale Mabry, Tampa, FL 33618, Max and Judy Rosenroth,

Winterset Raceway, US Rt. 27 South, Winterset Motel, Sebring, FL 33872; John Bisbee or Mac Myer, (941) 699-1140 or (941) 385-4448 *OCHER!

GEORGIA

A&S Hobbies & Raceway, 3389 Cypress Mill Rd., Brunswick, GA 31520; Edward

Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699

Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline, (912) 788-8731

Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912)

The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark

Sandy Cross Speedway, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573

SHILOH R/C Raceway, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912)

Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (770) 991-2225

A C 川 公 国 回 国

Stinger RC Super Speedway, 3769 Maysville, Rd., Commerce, GA 30529; Deric Sauls. (706) 335-5006 or (706)

Sugar Bowl R/C Speedway, 5272 Nelson Brogdon Blvd., Sugar Hill, GA 30518; Shelley Bailey. (770) 945-6709

Valdosta Hobbies, 3998 Inner Perimeter Rd., Valdosta, GA 31602; Ron Hood, (912) 244-2101

HAWAII Garden Isle R/C Racers, 5855 Ahakea St., Kapaa Kauai, HI 96746; Arnold Morales, (808) 823-0856

Kakaako Water Front Park Dragway, 98-029 Hekaha St., Alea Bay #32, HI 96701; James Inkyo, (808) 487-5155

Keehi Lagoon Park, Leeward Community College, Waipahu, HI 96797; (808) 676-5486

Maul R/C Racing Association, 430 Hookahi St., #13, Walluku, HI 96793, Tritech R/CHobbles;Radio Control Association, (808) 244-0526

Radio Control Hawaii, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629

Team PRC Racing Club, 176 Mamo St., Hilo, HI 96720; Charlie EO CAPRI

IDAHO

Capital Dirt Burners, 301 N. Bruce, Boise, ID 83712; Mike Ard, (208) 345-

River City Bandits, 4867 N. Yellowstone, Idaho Falls, ID; Chris Hummer, (208) 523-9846

Snake River R/C Raceway, 265 Highway 50, Hansen, ID 83334; Jim Tattersall, (208) 423-5122

ILLINOIS AJ's Raceway & Hobby, 10211 Keslinger Road, Dekalb, IL 60115; A.J. Schultz (815) 756-2772

C&R Hobbies, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-

Diehard R/C Raceway, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700.

Hobby Town Raceway, 9346 Virginia Rd. Lake in the Hills, IL 60102; Mike Hollingsworth, (847) 458-1777

Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (short)

Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-

Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441

A COM TO THE

Mitey Motor Speedway, 1109 N. Bloomington St., Rte. 23., Streator, IL 61364; Doug. (815) 672-4212

Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597

HEDRA

Pontoon Raceway, 3670 St., Route 111 Granite City, IL 62040-4304; Pat or Skip (618) 931-1206

ACCIDA

Outlaw R/C Speedway, 1614 Braodway, Mattoon, IL 61938; (217) 234-6229

AOCE TO BI

R/C Workshop, 3100 S.W. Adams St. Peoria, IL 61605; Al Kretz, (309) 673-4860

ADEGE

Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (630) 759-7557 ABOZ CO III

Rector's R/C Raceway, R.R. 3, Box 104,Albion, IL 62806; Tim Wolfe, (618) 842-9379 (M-F), (618) 446-3251 (Sun.)

Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618)

日間で配出谷同日 SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885

ADOCCE NO **Skokie Speedway**, 4880 W. Dempster, Skokie, IL 60077; Pete, (847) 674-7349

ACCOUNT Valley Farms R/C Raceway,706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984

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Wep Speedway, R.R. #2, Box 44 Lawrenceville, IL 62439; Bill Poe 日本と公司回用

INDIANA

Autograph/Race World, 231 Pendleton Ave., Pendleton, IN 46064: Sam Mudd

Bremen Racing Ent., 308 N. Bowen, Bremen, IN 46506; Dale Heuberger, (219) 546-3807 ACCION

Dirt Sligger's Raceway, 546 North 12th Ave., Beech Grove, IN 46107; Phil Riley, (317) 787-3815

Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901;

G.R.C.C.C. Inc., 1651 W. Franklin St. Elkhart, IN 46516; Pete Russell, (219) ACEMPIN

Hardesty R/C Raceway, 11 East Plymouth St, Hamlet, IN 4653;Max Hardesty, (219) 867-8600

AZMADONI Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299

K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350;

Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317)

P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, e-mail

A DOC COURT RC Barn, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600

ABOCO DE R.C.R.C. Raceway of Salina, 1300 E. Crawford, Bill Burke Park, Salina, KS 67401; Calvin Calp (913) 823-9588

* 0 < R/C World of Indiana, 2264 West US Highway 36, Lynn, IN 47355; Joe Kolp (317) 874-2464

Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803

The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

Rod's Off-Road R/C Track, 800 N. Division, Bristol, IN 46507; Rod Harms, (219) 848-7848

Stout Field Raceway, Greenwood Hobbies, 205 S. Madison, Greenwood, IN 46142; (317) 888-7256 ACCOBON

IOWA

Delb's Speedway, 423 11th Ave. So., Clinton, IA; Rusti's Hobbies, (319) 243-2697

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001, Paul Conlon, (319) 556-2736 A20CBD

Hobby Haven, 7672 Hickman Rd., Des Moines, IA 50322; Jim, (515)

Inside Challenge, 2028 Main St., Keokuk, IA 52632; Dan Hodges, (319)

ABC 公園園町

IROAR—Hawkey Downs Raceway, Hawkey Downs, 6th Street S.W., Cedar Rapids, IA 52404; Dave Kleinschrodt,

PERMADE

Manly R/C Club, Box 23 (Hwy 65), Manly IA 50456; Bruce Hill, (515)

ADDEND

Marble's Raceway, 4685 SE 40 St., Des Moines, IA 50317; Rick Marble,

HOOKSENGII

Mr. Car Raceway, P.O.Box 1112, Central lowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234

Outback Speedway, 403 State St., Guthrie Center,IA 50115; Helens Enterprises, (515) 747-3064

Radio Control Raceway Park, 2100 First Ave. North, Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780

A OCOL

Riverside Raceway, Veteran's park, Algona, IA 50511; Mike Beisch, (515)

Shentona Speedway, 1215 W. Lowell. Shenandoah, IA 51601; Doug Cross.

Wild Bill's Raceway, 901 W. Jones, Knoxville, IA 50138; William Anderson, JR (515) 842-5973

KANSAS Hobbytown USA, 2016 W. 23rd, Lawrence, KS 66046; Kevin Decemberus, (913) 865-0883

Mike's R/C Hobbies, 121 SE 29th Street, Unit #3, Topeka, KS 66605; Mike Barnard, (913) 266-5767 HOCABON

Ottawa Outlaw Raceway, 412 South Main, Ottawa, KS 66067; Tom Wilson, (913) 242-1450

R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; John and Kyle, (913) 793-2313

HOCASIN RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

KENTUCKY

Dixon's R/C Raceway, RR2, Box 505, hazard, KY 41701; Jeff Dixon, (606) 436-1902 or (606) 436-9559 AOCE

Johnny's Speedway, 3114 North Street, LLoyd, Greenup, KY 41144; Charles, (606) 473-0075

Pit Stop Hobbies, 106 A Street, Benton, KY, 42025; Robert Fitzgerald, (502) 527-8216 AOCE COM

Track Directory

ProTrak R/C Racing, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin,

AOC TO BOTH

AMOCUPI

Terry's R/C Hobbies, 691 Garner Ave. West Liberty, KY 41472; Terry McGuire (606) 743-2126

aced 60

Trio Hobbies & R/C, 216 Redmar Plaza, Radcliff, KY 40160; Maurice Johnson, (502) 351-7547

LOUISIANA

Baton Rouge Velodrome, 7122 Perkins Rd., Baton Rouge, LA 70815; Weldon Sharon, (504)665-5616; open Sunday 10-4.

Cajun R/C Raceway, 728 Perry Lane, Opel LA 70570; (504) 948-6350 MOCAGO

Indy Speedway & Hobby, 3753 General DeGaulle Dr., New Orleans, LA 70131; Vince Sheetz, (504) 367-1891

ADDICTION IN

Pontchartrain Hobby Shop, 3755 Pontchartrain Dr., Slidell, LA, 70458:

Red River R/C Racers, 3203 Old Shed, Bossier City, LA 71111; David Gray, (318) 747-1863

MAINE

Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap. (207) 946-

OCAHN!

R/C Speedway & Hobbies, 87 Main St., Fairfield, ME 04963; David Prescott,

ADDITION TO THE PARTY OF THE PA

MARYLAND

Cockeysville Astrodome Racers, 10854 York Rd. (rear), Cockeysville, MD 21030: ACE TO BOTH

Doug's Raceway, 2935 Crain Hwy., Waldorf, MD 20601; Doug Moran, Jr., 図の区沿目画司

Hobby Town USA, 8223-11 Elliot Rd., Easton, MD 21601; Bill Dyke, (410)

OMI

Outback R/C Race Club, Maiden La., Manchester, MD 21102; Randy or Bonnie Henry, (410) 848-4350

The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong,

MASSACHUSETTS

C&C Hobby & Raceway, 562 Russells Mills Rd., So. Dartmouth, MA 02748. 台灣 0 | 全谷 | 圓 | |

Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben,

Megaworld Raceway, Rt. 8. Curran Marth Adams, MA 01247;Bob

HOCODE

New England R/C Headquarters, 33 Fr. Devalles Blvd., Fall River, MA 02721; Chuck Gregory, (508) 673-6069

West Street Hobbies, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231

MICHIGAN

Akright Outback Racing, 984 Zimmer Rd, Williamston, MI 48895; Steve * OE H

Capital Area Racing Society, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 646-8224 or (517) 484-4028

Down River R/C Association/Riders, 1519 Oak St., Wyandotte, MI. 48192; Dave McCaslin, (313) 287-7405 or (313) 284-1560

Freedom Hill R/C Raceway, 29330 Coolidge, Roseville, MI 48066; Curley Grewe, (810) 776-5483

Larry's Performance R/C's, 43665 Utica Rd., Sterling Heights, MI 48310; Larry, (810) 997-4840

MCRC Raceway, 4601 Page Ave. Michigan Center, MI 49203, Sam

N.W. Michigan R/C Club 744 Munson Ave., Traverse City, MI 49686; Jim Ovaltt, (616) 947-6670

ADOCEMB

Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart (906) 293-3044

NO BOW

R&L Hobbies & Racing, 9782 Portage Rd., Portage, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744

Rodgers R/C Raceway, 7463 Ridge Rd., Britton, MI 49229; George Rodgers, (517) 451-8301

Thumb Raceway, 3441 Main St., Marlette, MI 48453; Jim Wilson.

APAB PI

USA Raceways, 6083 Dixie Hvy., Bridgeport, MI 48722; Dave

AMOICZE川谷田岡川

Vicksburg Off-Road R/C Raceway, MI 49097; Jeff Schroeder, (616)

*0289

West Michigan R/C Racers Club, 814 F. Railman St. Hastings, MI, 49058 Railroad St., Hastings, MI 49058; oug, (616) 948-2287 or Pat. (616)

Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Orlikowski, (616) 791-9902 (Open May through December)

MINNESOTA

's Hobbies & R/C Raceway, 6600 Cahill Ave., Inver Grove Heights, MN 55076; Duey Carlson, (612) 450-1721

Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Hapids MN 55744: Aaron Voges, (218)

Greater Minnesota Racin' Place, St. Cloud, MN 3302 Southway Dr., St. Cloud, N 56301; Jon Jackson, (320) 252-

AZOM

J's R/C Raceways, Rte. 2, Box 266, Starbuck, MN 56381; Jay Campbell (320) 239-4827

HOCE

Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749 HOL

Ray's Raceway Park, 105 3rd Ave. NE. Glenwood, MN 56334; Dan Winter, (320) 634-5246

R/C Racing World, 235 Main Ave. North, Harmony, MN 55939; Mark McKay, (507) 886-5931 or (507)

Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3:

FINOSCIA DE LA PROPERTIE DE LA

Trackside Racing, 443 8th Ave. NW, New Brighton, MN 55112; Winton Offsile, (612) 633-2112

Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Daloach, (218) 727-6248 A DOZEMIN

MISSISSIPPI

Fast Freddy's Raceway, 20390 Hwy. 49. Saucier, MS 39574; Mark

Joe McFaden Hobbies, 1619 51st

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-

MISSOURI

All Seasons Hobby, 152 O'Fallo Plaza, O'Fallon, MO 63366; Bob

A臓のくる全谷目回引

B&L Hobbies & Raceway, 2800 Anchor Dr. Park Hills, MD 63061:

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125).,Columbia, MO 65202; Gary Phillippe, (573) 682-

ANDICE

Fire Mountain Raceway, 86 63070; Dan Gordon, (314) 475-

Greentree R/C Racepark, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-

Ozarks R/C Raceway, Hwy 13, Brighton, MO 65781; Gene Rhode Ron Hawkins, (417) 742-4376 or

ACEMIEN

Real R/C Raceway, 24204 State Rt. 58, Pleasnt Hill, MO 64080; Steve Hale, (816) 540-5584

MONTANA

Stormer Raceway & Slot Motorplex,

NEBRASKA

Goodyear Superspeedway and Off Road, 4021 North 56th, Lincoln, N (402) 464-5000

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402)

ACE TO

ADCENTO B

Salvation Army South Corps, 4032 Harrison St. Omaha, NE 68164

Winners' Circle, 3368 N. 88th Piaza, Omaha, NE 68164; Robert Conner, (402) 571-1821 FIGIE

NEVADA

Dansey's Indoor R/C & Hobbies, 741 N. Nellis, Las Vegas, NV: David Lugo.

POCATE

Western R/C Raceway, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 260-9222

NEW HAMPSHIRE

Axis Racing R/C Dragway, 4197 High St., Hampton, NH; Dan Peterson,

Economy R/C Speedway, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470

Open Season Sports Center, Rt. 302 bon Rd., Lisbon, NH 03585; Joseph ggett. (603) 838-6602

AEZON!

RT 106 Racepark, 743 Clough Mill Rd., Pembroke, NH 03275; Douglas Graves, (603) 224-RACE

NEW JERSEY

America's Hobby Center Inc., 18300 onnelle Ave., Northbergen, NJ 17047: John Many, (201) 662-0777

Ray's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726;

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Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

Golden Hobbies Raceway, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222

ACCESE OF Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438;

Jerry's Hobby Center & Raceway, 336 Rt. 22W, Greenbook, NJ 08812; Jerry or Gary, (908) 752-6030

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

Millville R/C Oval, 114 N. High St. Millville, NJ 08332; William Densti (609) 327-4640

CAUP

Pit Stop Dragway, 100 Campus R Totowa, NJ 07512; Kimberly Frank (201) 956-7223

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731, John Fary

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

NEW MEXICO

Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wa Ward, 2230 Coleen Ct., (505) 523 4863 or (505) 526-1758 *OCABRI

NEW YORK

BarnStormers, MD #1 Old Oxford Rd., Chester, NY 10918; Lou, (91

A BOMBER

Beach Hill Speedway, 1760 Beach Hill Speedwa Hill Rd., Watkins Glen, NY Jim Riley, (607) 535-2616

Brian's Off-Road Track, 1124 N. Forest, Williamsville, NY 14221; Brian Was, (716) 633-8155

Brockport Speedway, 6000 Swe Walker Rd., Brockport, NY 1442

Brownie's Pro & Sport Hobbies, Bennett St., Staten Island, NY 10 1426; John Brown, (718) 727-21

BSK Hobbies & Raceway, 120 N St., Hornel, NY 14843; Bruce Hai (607) 324-4011, (800) 603-0197 **日之公田**同时 C&D Raceway, 12542 NYS Rte. Chaumont, NY 13622; Chris or Bourguin, (315) 649-5403

PEGON Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Ke Green, (518) 783-8036

ACCEPA Chipmunk Hill R/C Speedway,

Frogtown Hobbies, Mini Pines

Hal's Hobby Shop, 120 Cayuga Fulton, NY 13069; Hal & April Halstead (315) 598-2772

ACCOUNT. Hobby Images R/C Raceway, 8 Jerusalem Ave., Hicksville, NY 11801; Chris LaRussa, (516) 82

ACEGE Jerry's Raceway, 111 S. Apple Rd., Ithaca, NY 14850; Jerry an

ADDOMADOM LI 1/4-Scale Racers, 63 Horton Huntington Station, NY 11746,

* Long Island Raceway, 168 Bro Hollow, Farmingdale, NY 11735 James, (516) 845-7223

AMOREM The Model Shop, 1 Lakewood Monticello, NY 12701; Richard Ciminol, (914) 791-6075

Track Directory

Speedway/ The Hobby House, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701: (716) 488-1772

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P.R.O. Speedway, 5 Washington St., Cattaragus, NY 14719; Marc

AMOCIONA

Rampage R/C, 27 Fuller Lane, Hyde Park, NY 12538; Brian Walker, (914) 229-1379; (914) 229-2456

R/C Competition Corner, 2413 Brewerton Rd., Mattydale, NY 13211; Lori and Cos Ciririello, (315) 455-8718

ACCO

R/C Sport Hobby, 69-57 Jumiper Blvd. South Middle Village, NY 11379 ADOCE TO BE

R&S Hobbies, 356 Macedon Ct. Rd. Fairport, NY 14502; (716) 425-3722

Ringwood Junction, 1922 Dryden Rd., Freeville, NY 13068; Steve Miller, (607) 347-4198

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043;

Southern Tier Raceway, 88 Paige St., Owego, NY 13827; Anita Harding, (607) 687-5395

South Shore Hobby & Raceway W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567

Speedworld R/C & Hobby, P.O. Box 482, Chenango Bridge, NY 13745; Michael Magnusson, (607) 648-2063

Tri County Remote Control Car Club, 33 West Decker St., Johnstown, NY 12095; Jim Sprouse, (518) 762-8884

Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291

A DOCAL GOOD

Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339

Whitestone, 30-56 Whitestone Expy, (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155

ZOAR Road Speeedway, 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463

NORTH CAROLINA

A&J R/C Models, 2051 Anthony Rd., Burlington, NC 27215; Jerry Love or Burlington, NC 27215; Jerry Loye or Andrea Thompson, (910) 227-4556; fax

APAB I

The Antique Barn, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Seidlinger, (919) 237-6778

Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, fax (910) 431-

C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox. (910) 495-3482

C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321

Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (910) 452-2354

Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-

Hobby Club R/C Raceway, 1241 Buck Jones Rd., Raliegh, NC 27606; Hobby Club, (919) 460-8838

King R/C & Super Speedway, 143 Industrial Dr., P.O. Box 897, King, NC 27021; Chris Smith, (910) 983-5598 or (910) 883-3969

ABOKA MARIAN

Ride& Silde R/C Raceway, 5319 Yadkin Rd., Fayetteville, NC 28303; Jim Woodman (910) 425-5276 or Bill Culbertson (910) 867-4202

R&J Off-Road Racing, 6172 Blalock Rd., Lucama, NC 27851; Robert Williams, (919) 239-0853 or

Radio Jockey's Parkway, "RJ's," Rt. 9, Box 651, Fay, NC 28301; Tony Starling. (910) 486-4820

Rosewood R/C Speedway, 651 Community Dr., Goldsboro, NC 27530; Glenn Elam, (919) 731-4734 ACE TO DE

Southern RC Motorsports Club, Hwy. 17S., Shallotte, NC 28459, P.O. Box 1651; Mark Whitt, (910) 754-4902 or Eddie Ferster (910) 754-8528

Ultratrax,5505 Palmers Branch, Leland, NC 28451; Mike Williams, (910) 313-0350

NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419

Northern Mini Racers, P.O. Box 415, Minot, ND 58702; Roger Lee, (701)

Surrey International Raceway, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760

OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (330)

Canton R/C Raceway, 2206 13th St. NE, Canton, OH 44705; Dan Mauger, (330) 833-3091

ACOUNT

Classic Hobbies, 1994 E. Waterloo Rd., Akron, OH 44312; Walt Ellis,

ACCOUNT

C/R Hobbies and Raceway, Achtabula, OH 44004;

ACCEMBEN

CORCAR/ Sams Club, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159

Columbus R/C Racing Club (C.R.C.R.C), Franklin County Flargrounds, Hilliard, OH 43026; Jeff Crowell, (614) 236-1783

ANCEMBER

D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (330) 682-4266

Flag City Raceway, 3772 C.R. 18, Findlay, 0H 45840; Ruth Hubbard, (419) 422-5599

Fun for All Raceway, 675 College Dr., Batavia, OH 45103; Steve Donaldson, (513) 732-0440

A DOCCE MIDE

Hobby World, 3499 SR 59, Ravenna, OH 44266; Tom Fry, fax (330) 296-0894

Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818

Lakes Hobbies, 3425 Manchester Rd., Akron, OH 44314; Roy Spencer, (330) HOLFEGUR

Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt,

A DOZUMBION

Mid American Raceway, 13150 Airport Hwy., Swanton, OH 435 Bill or Chuck, (419) 475-9459

Mr. T's R/C Super Speedway, 5540 CR 16, Wauseon, OH 43567; Nick Tinsler, (419) 335-3196

* O < 8

Performance R/C Club of Ohio, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089

HOOKER

Scooters Hobby Hut, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411 A DOCE TO BOTH Tri-State R/C Auto Racers, Joyce Par Hamilton, OH; Ernie Bauhoffer, (513)

Van Wert R/C Raceway, 144 E. Main St. (above Hoverman Music), Van Wert, OH 45891; Mark Davis, (419)

ACEMBINE.

Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin ACE公田回回

OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-14 A SOCIO DE

Competition R/C, 100 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809 A DOCK MADE

Broadway, Coweta, OK 74 Seabolt, (918) 486-3948

ACCION

R/C Speedway, 1401 N. Vanburan, Enid, OK 73701; Sean or Jessica Hillery; (405) 237-5504

Remote Control Race Course, 400 S. Vermont Ave., Suite 104, Oklahoma Vermont Ave., Suite 104, Oklahoma City, OK, 73108; Rick or Steve, (405)

AOM BOM

Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

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OREGON

Eugene R/C Raceway, W. 11th and Beitline, Eugene, OR 97402; John Demings, (541) 718-0065

Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (541) 265-2825

R/C Plus Hobbies Raceway, 1857 25th St. SE, Salem, OR 97302; Ron Smith, (503) 364-9188

R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; Gene and Betty Jean Skelton, (541) 779-8298

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Yamhili County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

PENNSYLVANIA

A&D's Bumps & Jumps, RR7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750

A&E Raceway, Latrobe 30 Plz., Latrobe, PA 15650; Bruce Parker, (412) 539-7130

ACCION

Bachman's Speedway & Hobbles, Box 306, Effort, PA 18330-0306; Jeffrey Bachman. (610) 681-5845 ACEMBEM

Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161

Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635

ACEMBION.

Clearfield R/C Car Raceway, 4 Capricorn Ct., Clearfield, PA 1723 Shawn Richards, (814) 765-5608

Columbia Racing Association, 128 N. Front St., Philipsburg, PA 16866; Lurch Hammal, (814) 342-7114

APON

Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506 ADDCE TO M

DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200

Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052 A OCEAN OF

East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602 ADDOCEMBR

Hipkin's Hobbies, 402 W. Avondale Rd., West Grove, PA 19390; Doug, (610) 869-8585

Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-

Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204;

Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717)

AOC企画同日 Lug Nut Raceway, Rt. 309 at Hartman Rd., Montgomeryville Mart, Montgomery, PA 18936; Kathy Anderson, (215) 822-5831

ACE TO DE Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall. (717) 729-7458

ABOKE MADE

The Mushroom Bowl, 960 W. Cypress St., Kennett Square, PA 19348; Bruce or Drew, (610) 444-1850

ADDICATED AND ADDICATED ADDICATED AND ADDICATED ADDICATED AND ADDICATED ADDICATED AND ADDICATED AND ADDICATED ADDICATED AND ADDICATED ADDICATE Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; Mark, (215) 632-2344 or Tony (215) 742-3560

Pit Stop Hobbies, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr. (717) 653-6222

Pro Challenge Raceways, Wycomb Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don

ADCEMABON

Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (7

ACEGUAN

RC Outfitters RCO Raceway 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490

R/C Pro Speedway, Millville Rd., Bloomsburg, PA 17815; John Swist (717) 387-0266; tax (717) 387-493

HOZMERN

Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (8 AOC全谷里川

Rolling Wheels R/C Raceway, Wes

S.A. Hi Banks, Hahn's Dairy Rd, Palmerton, PA 18071; Scott Andres

Palmerton, PA 1 610) 826-4583

Sinking Spring Race Center, 237 St Hull St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760

Staub Bros. R/C Speedway, 31 Lo St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445

Willow Mill Speedway, 37 N. Sea Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445

Willow Run R/C Raceway, 135 W St., Corry, PA 16407; Jim Small, (

World A.T.L.A.S./P.A.R.C.E. R/C Raceway Hobby Shop & R/C Club Chester Exchange Mall, 10th & Mr St., Chester, PA 19013; Darryl, Ler Marc, (610) 874-2540

PUERTO RICO Cindra R/C Track, Carr 7787 KM Bo Beatriz Adentro, Cidra, Puerto 00739; Humberto (Tito) Lizardi, (

Dorado Offroad R/C Track, Pista Atletica Bo. Higuillar, Dorado Puerto Rico 00646; Roberto Lamoso/Jaime Ramos. (809) 796 or (809) 796-1734

Hacienda Muñoz R/C Track, Carr Juana Diaz, PR 00795; (809) 837

RHODE ISLAND SK Hobbies Inc., 15 Carl St., Jo RI 02919; Slim or Keith, (401)

ACEGION Tri-State R/C Raceway, 205 Hall Rd., Warwick, RI 02886; Raymor Dean (401) 738-4908

SOUTH CAROLIN Extreme R/C Raceway, 5976 Gr Lane, Myrtle Beach, SC 29577; Bullock, (803) 236-2083

.01 Hobbies and More, 1570 S. Ma Darlington, SC 29532; Jerry Pol (803) 393-0355

J&M R/C Hobbies, 5341 Dorch Rd., Evanston Plaza, N. Charlest 29418; Mike Smith, (803) 552-5

ORA Atomic Racing Facility, 373 Boyd Pond Rd, Alken, SC 2 Bill Jackson, (706) 855-0846 o (803) 643-0314

World Hobbies, 707 Sulphur S Rd., Greenville, SC 29617; Bot Pittman. (864) 246-4702 (Clos 4:00 pm Mondays)

HOMMARIA

SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895

Dakota Off-Road Racers, 2989 W. Br Co. 12, Aberdeen, SD 57401; (605)

R/C Action Raceway, SE Corner at 484th & Hwy. 38, Sioux Falls, SD 57105; Brian Cox. (605) 373-0511

TENNESSEE

Beaver Dam Racing, 7408 Royal Springs Knoxville, TN 37918; Ed Bardill, Tennessee Association of R./C (423) 922-4309

D&M's Downtown Raceway, 2703 U.S. Hwy, 411S, Maryville, TN 37303; (423)

ACEGEOM

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (206) 815-0379

• O < B

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley,

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583; (615) 836-8450 or (615) 761-3407

ACE TO IT

TEXAS AA Raceway, 1617 Foomey Rd., Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814 AOCEBII

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Brent Mahaffy,

AOP公司 PR

Fastrack Raceway, 301 Edith Drivel, El Paso, TX 79924; Hector Gonzalez, fax, (915) 779-4524

Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409)

Hal's Hobby Raceway, 1440 Bessember, El Paso, TX 79936: (915) 591-2213

The Hobby Center Raceway, 4104 Stan Schlueter Loop, Suite 1, Killeen, TX 765 Lawrence Remick, (817) 690-7311

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761

Hobbytown USA, 7676 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097

Hobbytown USA, 999 E. Basse Rd., Sulte 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697, tax (210) 829-8707

Indy R/C World, 220 Saturn Rd., Garland, TX 75041; Steve Webster, (214) 271-4844; fax (214) 271-4502 HOME WILL

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett, (409) 693-8095

●○○○公田司

North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471

North Texas 1/12 Scale Association, 3905 Sandia, Plano, TX 75023; Dean Densmore, (972) 519-0324

Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Jorge Tabush or Terry Schmid, (713) 464-4458

Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Glen Stead, (512) 949-8525; Race Hotline, (512)

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RACING

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

Tiger's Den R/C Speedway, 702 E. Broad St., Mansfield (DFW), TX 76063; Bob Burns. (817) 477-5513

T.Q. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Efren Saenz, (915) 821-7522 OBT

Triple Jays R/C Raceway, Route 4, Box 720, Allen, TX 75002; Jeffrey Jay Johnson, (972) 562-7967

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Tom Nix. (214) 438-9224

UTAH

Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303

Payson R/C Raceway, 955 South Main, Payson,UT 84651; Gus Wood, (801) 224-3852 and Lasca Wood (801) 222-8677

WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801)

VERMONT

Barre Town R/C club, 14 South Main St., Wall St. Complex, Barre, VT 05641; Russ Tribble or Pete Perreault, (802) 888-2860 or (802) 476-9458

ACCIO

Bradford R/C Racing, Main St., Bradfo VT 05033; Seth Bean, (802) 222-9674 ACCOM

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

VIRGINIA

Brown Brothers Hobbies, 924 North Main Street, Dumfries, VA 22026; Joel or Bob Brown, (703) 221-5746

Cooper's R/C Raceway, Rt. 4, Box 122B, Chatham, VA 24531; (804) 724-4182

Fairystone R/C Speedway, Rt. 4, Box 918, SR635 Goblintown, Stuart, VA 24171; Pat Moon Jr., (540) 930-3984

Gloucester Scale Hobbies, 2352 George Washington Memorial Highway, Hayes Plaza, Hayes, VA 23072; Rob Thein, (804) 642-3484 COMPA

Hobby Hangers Speedway, 14014 D Sullyfield Cir., Chantilly, VA 20151; Sullyfield Cir., Chantilly, VA 2015 Kwang or Billy, (703) 631-8820

The Hobby House, 116 Edds Ln., Sterling, VA 20165; Oppie, (703) 444-0333

KC's Radio Control & Repair, Rt. 4. Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804)

• O E

Olde Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197

Roadmasters/ Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833

RACING TO BRING YOU THE BEST!

D (Witerm:

Body of Evidence

As the NASCAR teams prepared for the 1997 season, we at Protoform were preparing an all new '97 Monte Carlo HS body for the high speed, high-banked tracks in hopes that it would continue the 16 month winning streak established by our '96 T-bird HS. As we waited with great anticipation for the NASCAR and NORRCA season to kick off mid-February, we heard reports of a strange phenomenon in a small upstate New York town. No, there were no "crop circles," but there were guys racingand winning-with the wrong kind of bodies!

Brockport Raceway was the site. They have a very healthy oval racing program that attracts racers every week from more than a hundred mile radius. Many of the regulars are wellknown (factory sponsored) racers that compete in the sanctioned Nationals. Racing is close, competitive and fun. The track is a banked carpet oval with a track record of 61 laps in Stock. It all began when Tom Parrish started winning with a long wheelbased Tbird HS clad race car. I couldn't believe what I was hearing so I went to see for myself. I did see him win the "A" that night, but I still attributed all of his speed to the ultra-trick Parrish built chassis (or the motor, or batteries, or ... you know the drill.)

Then, two weeks ago Mike Bevan equipped his car with one of the first '97 Monte Carlo HS bodies to come off the mold and promptly broke the Brockport track record and won the Main. I really wanted to believe that the HS body was a significant factor but I still wasn't convinced. I thought they were designed for velodromes!?! Well, Brockport's big "Anniversary" race was held last night and the A-Main results finally made me a believer that there is a future for the HS style, low-drag/low-downforce type body in carpet oval racing. Ace RC painter Brian Chudy not only won concours, but won the event with a #1215 HS Monte Carlo and Mike Bevin again made a 61-lap run in quailfying.

It's a well-known fact that "downforce" is usually necessary for traction on any kind of race car-real or scale-but when it comes to racing stock motored R/C cars, it's possible to have "too much" of a good thing. With today's wide range of foam-tire compounds and clever suspension designs, it's now possible to set up a car with a lot of "mechanical grip" instead of aero-grip" for banked car-



Protoform's 1997 Monte Carlo **HS** body with spoiler

pet tracks. It takes less "battery" to run a slippery body through the air for 4 minutes too! It might be worth a try! If you end up looking like "Swervin' Irvin" with the setup, it's pretty simple to change back to a proven higher downforce Protoform body.

While on the topic of alternative body uses, I have heard of racers using the DS (Associated Dual Sport) bodies on flat ovals and road courses. Protoform has released a 1997 Camaro DS (Trans Am series) and a version of the awesome Aurora GTS-1 (IMSA champ) to fit the Dual Sport. Because they are low and wide (8.12 inches in front and 8.37 inches in rear) they offer great stability. More food for

Many congratulations to Nick and Karen at K&N for throwing another great "Winter Blast" event, Protoform equipped racers, Frank Polimeda, Tom Barnhart and Steve Fiume who won big in mod, stock and 1/12-scale mod at the 1997 season's first major event. Well done guys!

New and Hot Protoform Bodies

- 1997 Monte Carlo HS (high speed/low drag) w/ spoiler 1408
 - 1997 Audi A4 (BTCC) touring car with 2 wings (180mm)
- 1409 1996 Opel Calibra ITC w/ 3 wings (190mm)
- 1410 1997 BMW 320i BTCC touring car w/ 2 wings (190mm)
- 1411 1997 Camaro (Trans Am Series) for Associated Dual Sport
- 1412 1997 Aurora (IMSA) w/ wing for Associated Dual Sport
- 1997 Volvo S40 BTCC touring car w/ wings (190mm) 1413 1414 1997 Corvette C5 (FIA GT series) w/ wings (190mm)
- 1997 Ram off-road truck for RC10GT (fits wide shock towers) 1512
- Ripper Double-X 'CR' buggy with wing for Losi Double-X 'CR' 1513
- 1997 Chevy C-1500 off-road truck for Associated RC10T2 & RC10T 1514 1515 "Scorcher" 1/8-scale gas body fits Kyosho Inferno MP-5

Racing to Bring You the Best!

RACING TO BRING YOU THE BEST!



"The Driving Force"

The annual Cleveland Indoor Championships was one of the most memorable events of 1996. Team Trinity/Jaco driver Joel Johnson wowed the crowd with his seventh 4-cell modified championship win. Joel led the field of 10 Pro-Line/Jaco drivers to victory on Purple fronts (2325) and Grey rears (2345). In fact, Pro-Line/Jaco tires won every class at this prestigious event:

Chuck Lonegran-winner Masters Class Mike Dumas-winner Stock class Frank Calandra-winner F-1 Class

The K&N Winter Blast was the first major event of the 1997 season. All the factory teams gathered at this race to claim bragging rights and hopefully start off the new year on a winning note. Team Pro-Line/Jaco's Frank Polimeda must have made winning races his New Year's resolution as he promptly TQ'ed 1/10- and 1/12-scale modified setting new track records in each class. Frank then went on to win 1/10 modified. Pro-Line/Jaco carpet aces Steve Fiume and Tom Barnhart won 1/12 modified and 1/10 stock respectively.

Pro-Line/Jaco picked the Snowbird Classic at the Thunder Raceway in Tampa, FL as the official debut of their much anticipated capped tire. Well, they were certainly worth the wait! Team Pro-Line/Jaco driver Frank Polimeda went out on his first qualifying run and promptly destroyed the track record by almost two laps. Needless to say, Frank was top qualifier as his 56-lap effort was the fastest run ever recorded at this track. He then proved this awesome performance was no fluke by dominating the 600-lap Enduro. Frank led almost every lap from start to finish, victorious by 9 laps over the nearest competitor. Frank used Green left front (2911), Green narrow rear (2914), Orange standard front (2932) and Orange standard wide rear (2936) tires.

NORRCA held its first super speedway event of 1997 at the Dominquez Hills Velodrome. This was the perfect opportunity for Pro-Line/Jaco to debut our new "V-rated" tires. Designed specifically for high speed velodromes, the V-rated tires use a very low rolling resistance racing rubber bonded to a lightweight inner core. A special thick-mil belt prevents the tire from expanding during high speed runs. How do they work? Well, Frank Killam TQ'ed, won and set a new track record in 1/10 modified. Derek Pough then proved the durability of the V-rated design by TQ'ing, winning and setting a new track record in the enduro. It's getting increasingly harder to stop "The Driving Force," Pro-Line/Jaco!

RACING TO BRING YOU THE BEST!

P.O. Box 456, Beaumont, CA 92223: (909) 849-9781; fax (909) 849-2968 Shamroc Raceway, P.O. Box 3739., Winchester, VA 22601; Kevin Allen, (540) 662-0403

Thunder Road RC Racing, PO Box 1022, Troy, VA 22974-1022; James Palmer, (804) 589-8174

ACE TO I

Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell, (757) 723-4170

WASHINGTON

Allie's, 108 South K St., Aberdeen, WA 98520, (360) 533-6638 AOM III

A-Main Raceway, 14011 NE 3rd Ct., Vancouver, WA 98685; Monty 571-8404

HOMBEN

Burien Toyola R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Meek. (800) 654-6456

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary and Sharon Brown, (360) 491-2430

HOMBI

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374;

ADDCC21168911

Hannegan Speedway, 4212 Hannegan Rd., Bellingham, WA 98225; Dana Hoggarth, (360) 734-

Raceway Hobbies, 188 Sunset Ave, S., Edmonds, WA 98020; Brian Bodine, (206) 774-3285

ADEC NO BOTH

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Manston, (509) 534-RACE

ASOCCABRI Tacoma R/C Raceway, 6305 6th Ave., Tacoma, WA 98406; Scott

Tearor Raceway, Fantasy World Toy and Hobby, 7901 S. Hosmer, Tacoma, WA 98408; Dave Kleinman, (206) 473-6223

Ultimate R/C Raceway, 907 Cole St. #3 Founday, WA 98022; Dan #3, Enumclaw, WA 98022; L Daugherty, (360) 802-2388

Zep's Hobbies & Raceway, 530 Interiake, Moses Lake, WA 98837; Steve Ralph, (509) 765-8191

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St West Union, WV, 26456; Mark Travis, (304) 873-2487

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003, James Fulton, (304) 233-5355 ACCOM

Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV

A BOZZEGE PR

Race Zone, Hopewell Rd., Rt. 8, Box 343A, Fairmont, WV 26554; Joe Clutter (304) 368-1000

ACE BOR

WVRCA R/C Club, 142 West Main. Rridgeport, WV 26330; D.W. Weed ADOCCE

WISCONSIN

ABC R/C, 244 W. Main St., Waukesha, WI 53186; Dick, (414) 542-1245 ACCAR

Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, ACCUMBRI

JJ's Dirt Heaven, 6028 County Road K, Champion, WI 54229; Jim or Jeff Jansen (414) 866-9096

AMOMB IN

Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holz,

ACCUMUN

NARCAR Raceway, 4331 E. Wall St., Eagle River, WI 54521; Mary O'Brien, (715) 479-5154

Pro-Star Racing, 726 Pine St., Green Bay, WI 54301; Chuck, (414) 494-1233 or Terry, (414) 469-5566

S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

WYOMING

Collectable Creations Off-Road Oval rack, 1790 Dell Range Blvd., heyenne, WY 82009; Phil Severson,

Wind River R/C Racing Association, 113 S. 3rd E., Riverton, WY 82501; Bob Belding, (307) 857-2068

ARGENTINA

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires; Jorge Herrero, 54-01-658-5851 BEARON!

Club A. Velez Sarstield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires; Jorge Herrero, 54-01-658-5851

CLACAM

AUSTRALIA A.C.T. Model Car Racing Club.

offroad track—Wanniassa Racewa Hyland Place, Wanniassa A.C.T.; indoor track—Epic Complex, Northbourne Ave., Canberra North A.C.T.; Gary Davey, 61-6-2871411

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070

Central Coast ORRCC, EDSACC Sports Complex, Bateau bay, N.S.W. Australia 2261; Peter J. Knight, 61-43-693-698

Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Met or Andrew,042-714-683

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; follywood Dr., Lansvale, NSV Rartolozzi, 62-2-907-9800

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Northern Districts Model Rally Club, Inc., Rear Stanford centre, 16 Stanford Way, Malaga, Western Austrailia 6066; G. Thirlwell, 61 (9) 249 3855; fax 61 (9) 249 4778; email

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ATR-Alka-Tele-Racing, 3570 Stationstraat 21, Alken Limburg; 0032-11-25-49-03

Cartroubles Indoor Buggy Track, J. Moonsstraat 52-56, 2160 Womme Igem, Belgium; Guy Ermes, 32-3-32 51-15; fax, 32-3-326-51-01

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MBV-Kampenhout, Teniersin 28, Kampenhout B1910, Belgium; Fran-Mostrey, phone and fax 0-16-65-75

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Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterie,32-55-31-36 48, fax, 32-55-30-19-12

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Phillipine F1/Touring Club, Super Mall I, EDSA, Quezon City 1156; Raymond Aguilar/Ron Villaflor, 896-64-15/23-30-08

Racer of the Month

been racing with his father, Steven, for six years. He currently drives an Associated RC10 Worlds Car with a Motor Man motor, Pro-Line tires and a Novak

The Hobby Warehouse Raceway offers racing three nights a week-Wednesdays, Fridays and Sundays-and the average turnout is 80 to 100 racers. With enough practice and time spent rubbing elbows with fellow track members Matt and Mark Francis of Team Associated, Daniel could become a pro, too!

ou'll find Daniel Mancine of Modesto, CA, at weekly races hosted by the

Hobby Warehouse Raceway in Sacramento. Only 11 years old, Daniel has

Philippine R/C Association, B.F. Homes Paranaque, Metro Manila 1700; Ronald/Manny Villatior, 23-30-08

Quezon City Radio Control Club, Quezon City Memorial Cir., Quezon City; Benjie Lumanlan, 731-94-53

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PORTUGAL Aero Clube da Madeira, Rua do Lairo F.2 Funchal, Madeira, astanheiro E-2, Funcia, i ortugal; fax 091-221265

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Parow Radio Car Club, Northerns Sports Complex, Parow, Cape Province; Stirling Spengler, 021-945-• 0

Phoenix Raceway, 11 Tugela St. Stilfontein, Transvaal: Lionel dwards, 018-4842863

.0 Pick 'n Pay Model Car Club, P.O. Box 11654, Klerksdop 2570; H. Grobks,

Pietersburg Model Racing, Landros Marais St., Pietersburg, Northern Transvaal; Peter Van Vuuren, 0152-293-0700

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Top 10 Coolest

OK, here's the most important stuff in the whole entire magazine. My picks-MINE!!!!!!





Wallace & Gromit



IN THE LAMESTREAN

The Macarena

Minivans

Calvin Klein (for the third year)

Smilingmannequinmen

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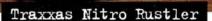


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Maria & Marcela

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